Engineering
DEC 11 1934

ELECTRICAL WORLD

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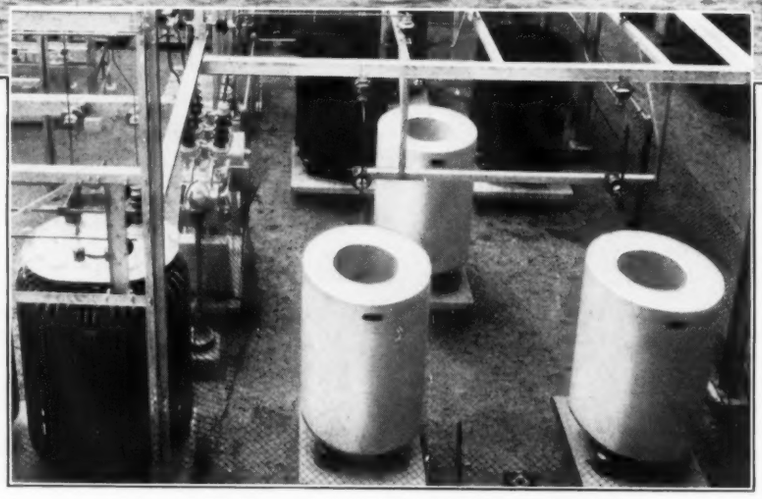
A. W. ROBERTSON
Chairman of the Board
Westinghouse Electric & Manufacturing Company

"When confidence increases the small business man expands his business and employs more men. The recipient of a legacy invests it in a business to make more money. Somebody tears down a building and erects a new one. The movement gradually spreads to the heavy industries as expansion needs develop. When they get under way the worst of the depression is over. Return of this confidence is difficult to detect; in fact, it is often with us for some time before we know it. I firmly believe the turn has come now, and if nothing unforeseen occurs a pick-up in the heavy industries should come next."

December 8
1934



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ELECTRICAL WORLD

FOUNDED IN 1874 • READ BY ELECTRICAL MEN FOR SIXTY YEARS

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Reader's Guide to This Issue

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THIS INDEX is merely a convenient guide. Many articles will appeal to several reader groups—many will apply to all. News and other departments are of general interest.

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VOLUME 104. . . NUMBER 16

Contents Copyrighted, 1934, by McGraw-Hill Publishing Company, Inc.

ELECTRICAL WORLD—Published every other Saturday. Price 25 cents a copy. Subscription rates: United States, Mexico, Central and South American countries, $4 a year; Canada, including duty, $5 a year; all other countries, $6, or 24 shillings, a year. Entered as second-class matter, January 20, 1907, at Post Office at New York, N. Y., under the Act of March 3, 1879. Printed in U.S.A.
Branch Offices: 520 North Michigan Ave., Chicago; 883 Mission St., San Francisco; Aldwych House, Aldwych, London, W.C. 2; Washington; Philadelphia; Cleveland; Detroit; St. Louis; Boston; Greenville, S. C.
Printed by The Schweinler Press, N. Y.

McGRAW-HILL PUBLISHING COMPANY, INC.
330 West 42d Street, New York, N. Y.

JAMES H. McGRAW, Chairman of the Board

MALCOLM MUIR, President
JAMES H. McGRAW, JR., Vice-Pres. and Treas.
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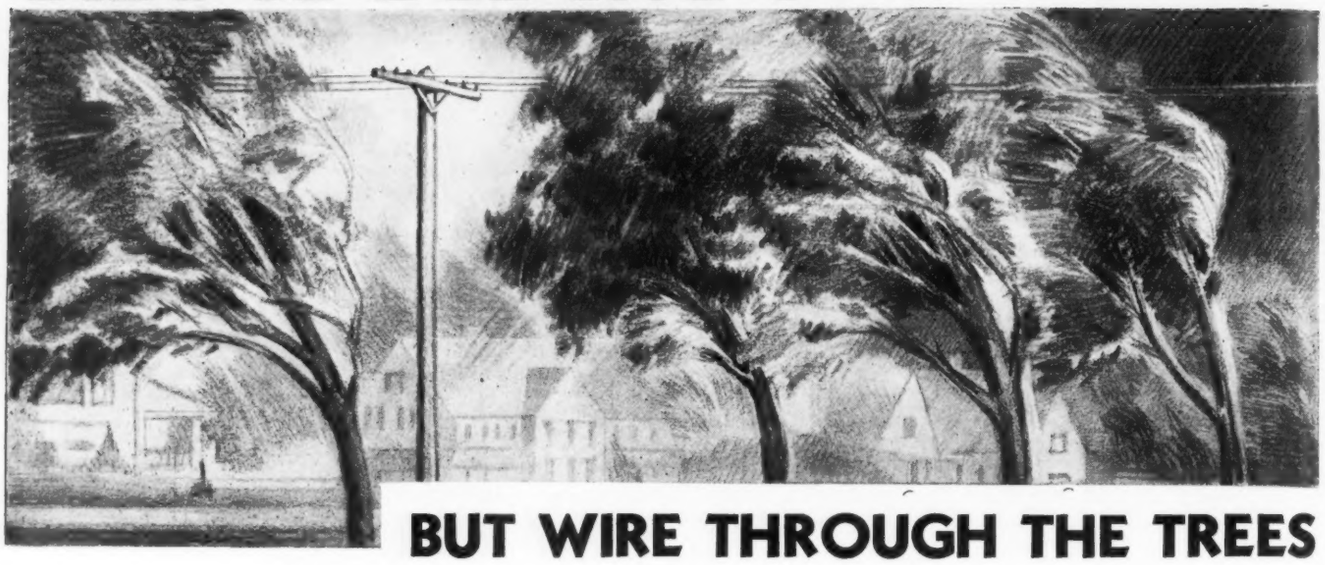
Cable Address: MCGRAWHILL, New York. Member A.B.P. Member A.B.C.

NRA CODE GRAPHIC ARTS INDUSTRY 1934 REGISTRATION NO. 31-1568

Let it storm!



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OKOLAST TREE WIRE will cut down the calls to the Trouble Desk, will make big savings in repair costs, and will prevent many interruptions to service. The winter and early spring, before the sap and foliage return, is a fine time to fix the "bad spots." But any time is a good time for installing OKOLAST—wherever shorts and grounds occur.

OKOLAST is a simply constructed tree wire. It has only **3** materials besides the conductor:

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OKONITE QUALITY CANNOT BE WRITTEN INTO A SPECIFICATION

...Trends...

As Gleaned From This Issue of "Electrical World"

▸▸ Where Load Waits

If domestic load building is the answer to the present problem of the power companies—and we believe it is—commercial policy deserves a lot of attention. The survey of nine months of merchandising in this issue shows why, when you compare prevailing practice in the number of salesmen employed, the money spent for advertising, the number of appliances sold. So the accompanying symposium on merchandising policy by nine prominent executives is impressive. They talk about the need for supporting sales with money, man-power and broad plans. They show where the individual markets lie —what makes a balanced selling program. It is important counsel to those who really want to do a load-building job.

▸▸ The Contractor Speaks

For ten years electrical men have been arguing about the cost of wiring, with power companies and contractors leading the debate. Leo E. Mayer, president of the contractors' national association, talks of the wiring outlook in an interview this week and urges cooperation between the two groups in the common need for industry recovery. He believes that reinspection offers the key to a vast market that will help the entire electrical field.

▸▸ Sales and Rates

Lower rates joined with sales efforts bring results. The trial efforts of Commonwealth & Southern, Milwaukee Electric, Pacific Gas & Electric and other utilities give convincing data. Now Hartford puts in a new trial effort. In this issue the data from Tupelo are indicative of what will happen in a moribund municipal property when it awakens, puts in low rates and exposes its customers to the full pressure of sales effort. It is high time manufacturers, utilities and dealers went after this business on a national basis. The public is receptive, but the industry lags in organized effort.

▸▸ P. F. Correction Pays

Industrial plants are finding it good business to correct power factor. C. B. Schafer and W. V. Gorton cite a splendid example of savings from power-factor correction in this issue. It shows that both capacitors and synchronous motors were used to good advantage. Before industries add new capacity they should look into power-factor correction. Utility power salesmen and manufacturers of corrective equipment can aid in this service, for power-factor correction requires engineering that may go beyond the industrial plant itself in order to derive maximum benefits.

January 5 Electrical World

Annual Review and Statistical Number

What business did the industry do in 1934 and what does it expect to do in 1935? This issue will give the answers. Complete data and estimates for utilities and manufacturers. Authoritative reports on engineering and commercial developments. This issue will be a handbook of useful information for every electrical man.

▸▸ Cable Splices Save Money

Too frequently it is uneconomical to operate a salvage yard for electrical equipment. But on revamping installations there is often opportunity to make savings by use of salvage methods. A good example is given by Herman Halperin in this issue. When cables were rerouted about $60,000 was saved by making duct splices of the kind described. The case is special, but it serves to illustrate the value of original ideas in utility system remodeling.

▸▸ Save the Eyes

Tests in schoolrooms show the necessity for better lighting. We spend about $400,000,000 a year for schools and too frequently neglect the essential element of school lighting. The test example in Pittsburgh shows 28 per cent improvement in class work when good lighting is provided. No value is placed upon the lessened eye strain. Utilities and lighting manufacturers have a big and valid market open to them in this application.

▸▸ More Millions for Power

Washington and Oregon are going to be flooded with electric power upon completion of Grand Coulee and Bonneville. What will they do about it when power use already is more than double the national average? House heating is advocated. New industries are to be developed. Rural electrification will be magnified. However, no organization and but the vaguest of plans exist for doing any of these things. The Northwest is building dams and power houses on federal money as a relief measure and not as a business venture.

I-20

Any Housing You Want

—But above all an ACCURATE Watthour Meter

THE choice of housing for your watthour meters is, of course, important. To meet your requirements, the new G-E Type I-20 meters (I-20-A, I-20-B, I-20-C, and I-20-S) can be furnished in several styles of housings.

But more important than housing is the selection of the meter itself. Upon accurate registration depends your revenue — and therefore your profits; and we want you to consider the features which contribute toward making the I-20 meter exceptionally accurate under all conditions of service.

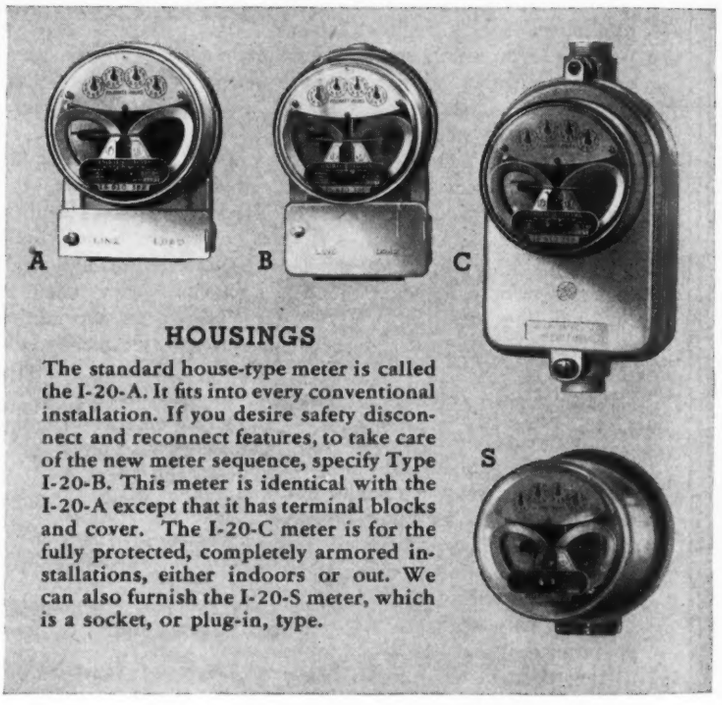
High torque, which insures accurate registration for long periods of time.

Long-range accuracy, which insures correct registration from light loads to the heavy loads taken by present-day residential consumers.

Independence of circuit conditions, which means that variation in voltage, frequency, and wave form do not affect performance.

Temperature compensation, which allows the meters to be installed anywhere, regardless of the most extreme variations in temperature, and still register with remarkable accuracy.

And of vast importance is the service record. The element in the I-20 meter is fundamentally the same as the element in our well-known I-16 meter, and the millions of I-16's in use, many for more than eight years, attest to the reliable and accurate performance of G-E watthour meters.



HOUSINGS

The standard house-type meter is called the I-20-A. It fits into every conventional installation. If you desire safety disconnect and reconnect features, to take care of the new meter sequence, specify Type I-20-B. This meter is identical with the I-20-A except that it has terminal blocks and cover. The I-20-C meter is for the fully protected, completely armored installations, either indoors or out. We can also furnish the I-20-S meter, which is a socket, or plug-in, type.

A new catalog on G-E watthour meters (GEA-615C) is soon to be issued. If you will address a request to the nearest G-E office, or to General Electric, Dept. 6B-201, Schenectady, N. Y., we shall be glad to send you a copy as soon as it is available.

400-6

GENERAL ELECTRIC

ELECTRICAL WORLD

MANAGEMENT • ENGINEERING • OPERATION • UTILIZATION

PUBLISHED EVERY OTHER SATURDAY

DECEMBER 8, 1934

Fight It Out in the Home

SELLING has taken on a new significance in the power industry. It began as a fad. For years we have been experimenting, trying this, driving on that, learning how to sell. Now the picture changes. Taxes are piling up. Rates are being forced down. Earnings are dwindling. Selling has become a necessity, if the power companies are to survive.

But, of course, they will survive! This is no calamity, this unaccustomed situation. It simply means that the electric light and power business has come to its commercial maturity. It has reached at last the status that is considered normal by every other seasoned manufacturing and service enterprise, where it must sell to keep alive. In a word, the power company has now consciously become a business activity rather than an engineering development or a protected monopoly. This was inevitable, and it is well. There is no such thing in life as permanent protection.

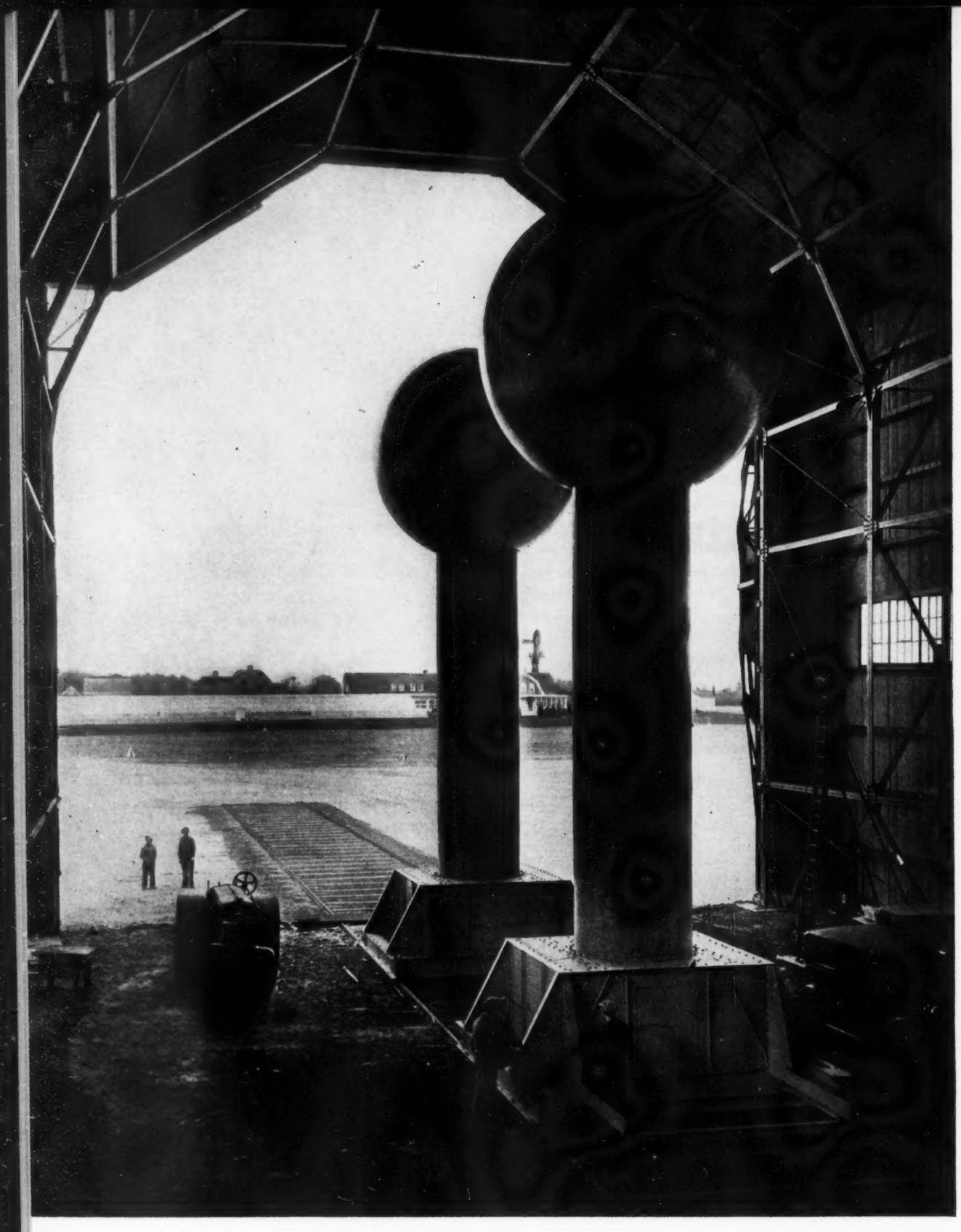
So now the power industry, to carry its lower prices and its higher costs, must do more selling to get more revenue—which is just what every other business does in an emergency. And in its urgent need it has decided to fight the problem out in the homes of its twenty million domestic customers.

The commercial heads of the power companies have had a world of experience in selling light and the other domestic uses of electric service for health, comfort and labor saving. A good start has been made. And man-power is available now to do the bigger job of bringing the full use of this complete electrical equipment into general acceptance. The stage is set and action can follow just as soon as the right steps are taken.

The marketing of any important idea or product to the American people has always been accomplished by a combination of national promotion and local selling. The camera, automobiles, radio, safety razors were swept into popularity and universal use by capturing the interest of men and women throughout the land by a great concerted advertising program, that presented the idea. Then a highly organized local distribution merchandised the product in every community.

AND fortunately here, too, we have gone part way. Electrical equipment is already known. It is on sale in every town and city. Some advertising has been done for years. The need now is for broader plans and better co-ordination in each community, more liberal financing of utility sales departments, larger volume merchandising and the creation of a strong local trade to sell appliances.

But to sweep our new ideas and products into universal acceptance national promotion is also vital. And so the power industry needs some big affirmative movement, tied to appealing rates and appealing appliance prices that will sound a dramatic call to John and Mary everywhere. Such an opportunity can be seized in the present drive to modernize America's homes and the intense current interest in the social benefits of electric service. It is more than an opportunity. It is an obligation. It is a challenge to electrical men to step out in the common effort to build back prosperity through constructive action. Let's raise the banner for a two-year drive to equip the houses of this country for health, economy and comfort. It is the answer to the power man's problem. Fight it out in the home! Let's do it in a big way that will help create enduring recovery.



SEVEN-MILLION-VOLT "SIEGE GUN OF SCIENCE"

Van de Graaf's electrostatic d.c. generator at Round Hill, Mass., research station of the Massachusetts Institute of Technology makes man look puny alongside its 14-ft. tracks, high trucks, 25-ft. textolite columns and 15-ft. aluminum-alloy spheres. Observers and their instruments occupy the inside of the spheres during tests. Faraday's "ice-pail" experiment assures their safety and Winshurst, Toeppler and Holtz assured the means of pyramiding the charges which accumulate their voltages

Merchandising Policies That Build Domestic Load

A Symposium of Executive Opinion on the Essentials of Power Company Commercial Policy for the Development of Electric Service in the Home

For many long years power company commercial managers struggled against the restrictions of unsympathetic or unenthusiastic executive direction. That day is now gone. Selling is in the saddle and the salesman is "on the spot." The problem today is to build load rapidly to meet the pressing need for increased revenue. The most immediate opportunity lies in the home and the merchandising of appliances has become an absorbing problem throughout the industry.

But the man responsible for load development needs more than a clear track signal. He must have money, authority and man-power, if he is to produce results. And it is the responsibility of the chief executive of the company to see that he is provided with the right supporting policies.

In the following statements nine men who speak with authority on these subjects, in the electrical industry, present their points of view on the present prospects for load building through appliance merchandising and the methods which should be employed.

Spending for Load Building

It costs money to develop markets and build load — Capital must be invested in the financing of installment selling and subsidizing of a balanced sales program that recognizes the value of new business

By WENDELL L. WILLKIE
President Commonwealth & Southern Corporation, New York, N. Y.

Harris & Ewing

RECOGNITION is spreading throughout the power industry that a solution of the present economic problem of electric public utilities is to build up domestic load. Political attacks all center on the cost of electricity to the home. The federal "yardstick" experiments and municipal elections are all focussed upon the rate for electric service to the householder, and that is what the voter has in mind when he goes to the polls. The fairest answer and the surest defense against competitive government power projects, therefore, are for privately operated power systems to so increase their household use of electricity that domestic rates may be reduced to the point where the differential between the cost of service for private companies and government operations becomes so inconsequential that it will no longer constitute a political factor. Electricity will then be so cheap that nobody will be concerned over the insignificant saving that the politician can promise from a publicly operated supply.

To accomplish this end, however, will require more than good selling. It will need good spending also. The appropriation of money for commercial activities, the investment of capital in load development, will have to receive more serious consideration and be supported by a more liberal executive policy than has been general in the past.

Load building on a scale adequate to satisfy the need, in my judgment, can only be accomplished by financing the sale of appliances on long and easy terms. Our experience has shown that this is entirely feasible, for the credit loss for this long-term financing of household appliances does not exceed 3 per cent. Such a contribution for the purpose of extending the use of our service is surely not sufficient to deter any one from adopting a liberal financing program, if he has assurance that it will hasten the growth of this needed domestic load.

Term financing of appliances will not in itself put load on the line, however. To meet this situation power companies must, of necessity, also subsidize their sales departments by hiring additional salesmen, demonstrators and home economists, for there must be plenty of man-power and printed promotion to do the work. We have found that the extra sales which this added effort produces fully carry the increased expense.

Naturally, there is no rule of thumb to follow in determining appropria-

tions for load building. Any commercial program must be based on past volume to some extent, but it must be borne in mind that there is an urgent need. What was sold last year may not be a fair index to what can be sold this year, by better planning and better spending. We must plan and spend and work, not for an ordinary increase in sales, but for a greater growth of load, out of proportion with past accomplishments.

Organizing for Load Building

Creation of load on the scale now necessary calls for a strong selling staff armed with adequate authority and an ample personnel

By A. F. HOCKENBEAMER
President
Pacific Gas & Electric Company,
San Francisco, Calif.

SUCCESS of the utility industry under present-day conditions lies very largely in maintaining an aggressive sales policy. We must overcome the greater saturation of the market for electric energy as well as the situation created by a steadily falling rate level, under which a substantially larger number of kilowatt-hours must be sold to replace the dollars of gross lost through rate reduction. Faced with increasing competition, added labor costs, higher tax burdens and insistent demands for lower rates despite a decreasing rate of return, the utilities have only one recourse—to sell courageously, aggressively and consistently.

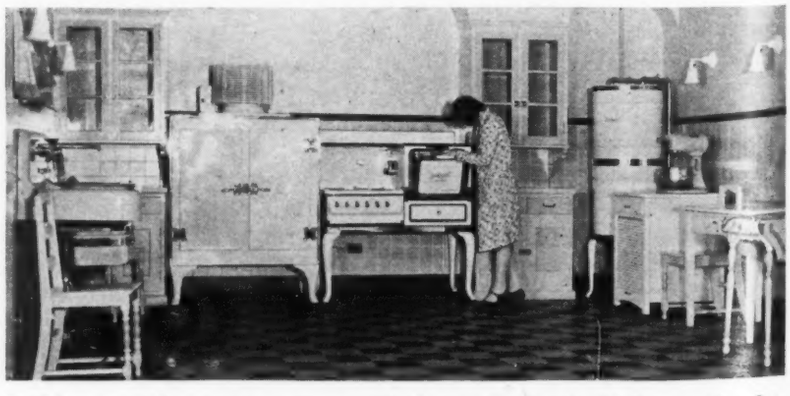
We now face an unparalleled wave of undiscriminating criticism and abuse, because we have followed the plain line of duty by defending the rights of millions of our security holders. We must confound and startle our critics with new leadership in business development, just as our initiative and enterprise have led in the engineering and construction of the nation's great power systems. Pressure for lower rates—yardstick rates, if you will—must be met with new business campaigns more intensive, more carefully planned, more skillfully organized, more adequately financed and, finally, more attractive to the public than any we have undertaken in the past. I have always held that the prime formula for reducing rates is increased sales.

In the past ten years Pacific Gas & Electric Company has expended approximately $12,000,000 for the purpose of increasing sales. For every dollar spent we have secured about three dollars of new revenue. I call that good business for us. But it has been good business for our customers as well. The accumulation of our electric rate reductions for the period 1928-1933 alone amounts to more than $28,000,000. Without increased sales these savings to our customers would have been impossible.

Our own load-building program is based on organized industry teamwork. In 1934 our expenditures for gas and electric promotional work will approximate $1,500,000, and if present plans materialize we will have an equal budget for sales and advertising in 1934. Dealer co-operation is the keynote of our plan for selling appliances which have customer acceptance. Our direct sales efforts are aimed only at those load-building appliances requiring intensive sales promotion to secure this acceptance. All of our advertising is co-operative; that is, it is designed to bring business to the dealers in our territory whom we recognize as a large potential sales force. In addition, we work on the theory that every employee of the company should be a good-will and business getter.

In the federal housing and modernization program we recognize a real opportunity for building new load. We are capitalizing on this program and co-operating with the various agencies engaged in its promotion to the fullest possible extent. As a further promotional aid we have just announced an offer to all domestic and commercial customers of a 50 per cent discount during the year 1935 of the amount by which their bill for any month exceeds the amount of the billing for the corresponding month of the previous year at the same location. Its obvious advantages to the consumer should stimulate appliance and equipment sales for the entire industry.

A commercial department which delivers profitable load warrants support. It must be given the leadership that will insure enthusiasm and creative enterprises. It must be given the responsibility and the opportunity that encourage and develop men. The financial stability of the utilities and their future progress depend upon increased loading of existing facilities and consequent reduction of unit costs. This must be produced by aggressive, intelligent and well-directed sales organization, amply provided with the necessary men, money and authority to execute well co-ordinated sales campaigns, with scope and power adequate to increase revenues and improve load factors faster than we have ever attempted before.



Cooking appeals to every woman. So demonstration is the key to the electric range market, and water heating follows

Creating a Local Trade to Sell More Appliances

Local trade must play a vital part if appliance merchandising is to be built up into a large volume of going business in the community

By GEORGE W. MASON
President Kelvinator Corporation, Detroit, Mich.

AMONG the power companies with which we have contact a change has been noticeable during the past year. There is a growing confidence that aggressive merchandising of electrical appliances by utilities need not involve a sacrifice of amiable relationships with local appliance dealers. To me this represents the laying of a most important foundation stone. It indicates that power company executives are realizing that the building of permanent volume in appliance revenues demands liberal merchandising policies carried through to a successful conclusion.

There is no doubt that the great majority of power men recognize that their immediate salvation lies in vastly increasing the number of appliances on their lines. At the same time they see concrete evidences of the hostile attitude toward utility operations that has been allowed to grow up in recent years in many parts of the country. Until lately, therefore, aggressive merchandising of appliances has been shunned by many power companies, not only because of legal restrictions but also because it was felt that the resulting local dealer opposition would add fuel to the fire of ill-will that it was so obviously necessary to quench. In many instances past experience has seemed to justify continuation of a passive attitude.

Within the past twelve months, however, dozens of power concerns, finding that rate reductions and the condition of the securities market had closed the gates to other courses, have gone vigorously into appliance selling. A composite picture of the operations of these firms proves conclusively that where there has been far-sighted leadership, generous expenditures for advertising and sales promotion and a whole-hearted attempt to develop a permanent local trade the utilities are not only greatly increasing their revenue but also—far from incurring public and dealer disfavor—are actually winning abundant local support.

The methods used in building a sales organization and in developing a productive promotional program must necessarily vary from company to company and from community to community. In all cases, however, there is apparent the importance of comprehensive, carefully planned programs designed to educate the public to an appreciation of the values of modern electric refrigerators, ranges, air-conditioning equipment and other appliances. What these educational programs must include in the way of advertising and sales promotional expenditures, how many engineering counselors or home economists they may call for—these and related problems all must be worked out to fit the individual case. Much of the effort can be lessened by tying in with appliance manufacturers, who have available effective sales plans and campaigns especially adaptable to the needs of utilities.

In every such load-building program, however, the development of the local trade should be a major objective because it automatically creates additional man-power for immediate selling and also provides for the gradual establishment of a larger number of retail stores about the community that will be needed to supply demand as the popularity of all these electrical household appliances increases. It is not too soon to be planning for this by deliberately strengthening present dealers and interesting more enterprising retailers in the possibilities of the electrical market.

Greater Market for Refrigeration

An experience in building refrigeration load — New and wider field now waiting development — The important factor of executive attitude and support behind a program that is adequate

By J. E. DAVIDSON
President Nebraska Power Company, Omaha, Neb.

I HAVE a letter in my personal file. It was signed by a ranking electric utility executive. It reads in part:

> Our company does not plan to take any part in the proposed electric refrigeration activity. We do not want an Electric Refrigeration Bureau in our city. We do not believe much can be accomplished trying to push electric refrigerators during these times of economic stress.

This letter was sent to me in 1930. Since that letter was written there have been sold in the United States up to 3,900,000 electric refrigerators —and "during these times of economic stress." This stupendous selling effort has brought $85,000,000 in annual new revenue to power and light companies of this country, without additional plant investment.

When the Electric Refrigeration Bureau was launched I was surprised at the lack of interest and aggressiveness. Here were millions of dollars in revenue waiting to be reached, and many of our executives hesitated and hemmed and hawed before getting started. However, with efficient headquarters and field staffs, proper momentum was developed and practically every company participated.

When we launched the co-operative electric refrigeration activity in Omaha in 1930 there were 8,700 refrigerators on our lines. Today we have 40 per cent electric refrigeration saturation with 21,400 refrigerators in use. Since 1930 we have put on our lines in this way $254,000 in new annual revenue —without any additional plant investment. We are still old fashioned enough to think that this is real money and worth having.

Many of the executives who read these articles will do nothing. That's their business. But I repeat that we have not yet scratched the surface of domestic load building with electric refrigerators, or any other major appliance, or small devices or illumination. So 1935 should bring a golden harvest of refrigeration sales in spite of the brilliant record of the past four years, if proper plans are formulated and executed for co-operative advertising and selling.

But even a well-laid-out plan of selling action is not enough. There must be courageous and aggressive leadership. *There can only be one leader in this work and that is the electric utility.* In order to have a successful electric refrigerator activity there must be close co-operation between the electric utility and the other selling agencies. It is too big a selling job for any one selling agency.

It is regrettable and sometimes discouraging that more interest is not taken in such co-operative selling efforts by executives of the power and light companies. As executives, we have certain obligations. We must render our customers the utmost in service. We must guard the investments of our security holders. By serving our customers well, we protect the interests of our security holders. In my opinion there is not a better, *quick* method of accomplishing both of these objectives than through greater and more intensified electric refrigeration promotion.

Here are my suggestions for success in electric refrigeration selling in 1935:

1. Build a good plan of advertising and selling.
2. Finance the plan sufficiently.
3. Execute the plan with courage and aggressiveness—continuously.
4. Obtain, hold and enthuse the co-operative interest of every selling agency.
5. Stay up in front, leading all the time.

But to do this, ranking executives of electric companies must maintain interest in both methods and results. Responsibility for the success or failure will in no small degree rest with them.

Selling the Home Laundry Field

A neglected opportunity for load building and customer service — Methods that have brought good results — Separate selling needed

By E. W. LLOYD
Vice-President Commonwealth Edison Company, Chicago, Ill.

HIGH concentration on the sale of refrigerators and ranges has to some extent diverted the attention of the power industry from other heavy-duty appliances which should have a larger place in the home. Electric washers and ironers both are real labor savers and deserve support.

The national saturation for clothes washers is now 43.9 per cent and for ironing machines 4.0 per cent. In Chicago we believe our local saturation is close to 60 per cent and 6 per cent. In 1933 we sold 3,803 clothes washers and 598 ironing machines and this year expect to sell 4,200 washers and 1,200 ironers. Dealer sales are large. No company, I would say, should be satisfied with less than a saturation of 70 per cent for washers and 50 per cent for ironers.

Millions of homes are still to be sold the idea of refrigeration

These two devices are not easily merchandised on the floor of a salesroom. About 25 per cent of this class of merchandise is bought and 75 per cent is sold. Therefore it is necessary to develop an outside sales organization, thoroughly educated in the job. Most of this equipment must be sold by commission salesmen, although there are instances where salary and commissions have worked out very well. A fair commission is 15 per cent on the sales price and a man should be able to earn $75 a month to be worth keeping.

The salesman secures prospects by devoting part of each day to cold canvassing, by working a few days each month on the sales floor, from customers who have just finished purchasing other appliances, by telephone solicitation, through laundresses and waitresses, from neighbors of the women he sells, from direct mail and newspaper advertising and from manufacturers' exhibits and demonstrations. Out of ten prospects about three demonstrations can be made, which later on should result in one sale. In cold canvassing from door to door it is necessary to make forty or fifty calls to make one or two demonstrations. At present saturation on laundry equipment it is safe to assign one salesman to 5.000 domestic consumers.

Canvassing prospects is the hardest thing to teach a new salesman. He must be persuaded that it is necessary for the continuity of his income. These salesmen need much help. It is desirable to prepare a short memorized door approach to help them get interviews, and frequent meetings under the direction of a sales supervisor are necessary.

Proper displays of washers and ironers are most important. These store displays are manned by rotating the field salesmen from day to day. Sales are encouraged by allowing a portion of the regular commission to go to the man making the demonstration regardless of the district in which the delivery is made. Enthusiasm and ambition are maintained by contests, bonuses, special sales and continued field training backed by advertising.

These devices are genuine labor savers and if of good quality have first class public relations value. But, like anything else, they must be sold intelligently and consistently to build up a volume. The women of the community must be interested in the advantages of electrical laundry equipment before it will become popular and sell easily. A well-thought-out program of promotion and selling must be followed. Money must be appropriated to run it and men must be put in charge if this home laundry load is to be built up.

If a company is operating an appliance sales division it is important that a broad line of household appliances be carried, as the more diversity of good appliances it has to sell the less the overhead cost per dollar of sales. But the merchandising of these laundry appliances must be organized as a separate selling operation directed at a definite market. And if it is properly handled it will be profitable both as merchandise and as a builder of load.

The Challenge of Air Conditioning

Two problems in selling the air-conditioning market — Definite program and adequate personnel vital — Need for a progressive policy

By C. E. MICHEL
Sales Manager
Union Electric Light & Power Company,
St. Louis, Mo.

DURING the latter part of August and the early part of September, this year, I noticed a change in the public attitude in the country toward summer air conditioning. The columns of newspapers and magazines were filled with articles on air conditioning which were written by staff writers. They were not articles inspired by someone interested in the air-conditioning business. When our daily press and our magazines devote their space to a subject, that subject is a live one. It means that it is accepted by the public.

This presents us with a new challenge. It is no longer our job just to promote the idea of air conditioning but to sell air conditioning to the public in order that this great boon to humanity may be enjoyed to the fullest extent as well as to increase our kilowatt-hour sales and our annual revenue. If further proof is needed, the year 1934 will furnish it.

On our own lines the number of air-conditioning installations made during the first eight months in 1934 were approximately double those for the corresponding period of 1933. Up to December 31, 1933, 58 residential installations had been made. During the first eight months of 1934, 63 additional residential installations were made. Many of these were the small self-contained units and they present a merchandise opportunity matched only by the domestic refrigerator.

There are two distinct problems involved in air conditioning, the small "package" sale and the large engineering job. The small unit equipment can be pushed during the hot weather, the natural season of appeal, but the results that can be obtained are lagely dependent upon the educational work that has been done during the year to build up desire so that action will come during the summer. This is essentially the situation at present in the residence market.

The reverse is true of the large buildings. The time to sell them is not during hot weather. At that time the most that can be accomplished is to arouse the interest of the powers that be—the owners of the building—the executives of the corporation that occupies it—and bring them to the point of desiring to know what it would cost. Then comes the engineering of the job, the layout for the system and the installation job itself. That takes time. It involves budgeting, appropriation, authorization, preparation—all of which must be completed in time for the air conditioning to be ready before hot weather returns. The actual installation requires from four to six months.

Development of the air-conditioning market by a power company must recognize these conditions and provide for them. It calls for a definite program and an adequate personnel. This program will depend on the character of the community, whether the market is large or small, the intensity of heat and humidity prevailing in the locality and whether the power company merchandises direct or promotes the sale of air-conditioning equipment through dealer outlets. Definite recommendations are available in the Edison Electric Institute report published last summer.

In St. Louis we have a highly skilled engineer with four assistants who devote their entire time to air conditioning. The work calls for the most constructive selling for air conditioning is now in the same phase as the automobile was when the operation of the engine had to be explained to every customer and competition was fought out on the technical claims of rival manufacturers. It is still necessary to work out the engineering of each job of air conditioning and to explain the principles involved. Therein lies the answer to the oft-repeated question: What makes it cost so much today? The men who do this must be specially trained.

The development of an air-conditioning load, therefore, calls first for the establishment of a policy. We estimate that an ordinary home in which one large room is air-conditioned will consume 800 kw.-hr. a year. Completely conditioned it should consume 2,000 kw.-hr. annually. We believe there is enough of this business available to be worth going after. This is the first decision to make. Then there must be man-power, a sales plan, a promotion program and a co-operative arrangement with dealers and installers, all properly supported in the budget. With this done, air-conditioning will come onto the lines.

Building More Load With Range and Water Heater

Advantages of all-employee selling — Vital importance of building up support throughout the entire organization — Methods may vary, but policies must be liberal — Vital importance of executive support

By H. M. SAWYER
Vice-President American Gas & Electric Company, New York, N. Y.

SUBSIDIARY companies of the American Gas & Electric Company have been successful in placing about 30,000 electric ranges and 2,500 electric water heaters on their lines, most of them in the past five years. The fact that we have been able to do this in spite of low fuel costs from other sources is in no small measure due to the recognition given to load building by men of these organizations whose duties are not strictly commercial. Our chief executives realize the primary importance of our selling program and give it their personal interest. They have a knowledge of the details of how these programs can be made successful and appreciate the need for their personal support and effort if residence revenue is to be built up.

In our companies sales meetings are now held where only a very small proportion of the attendance is represented by the sales department itself. Accountants, line crews, meter men, power plant employees sit in the front rows. Competition for prospects among employees outside of the sales force, and intercompany competitive campaigns in which the interest of all employees can be aroused, have materially increased the sale of this heavy-duty equipment. In addition to producing a large volume of prospects to which the sales department then applies itself, it also has the virtue of selling our own people on the value of these appliances. In fact, about 60 per cent of the employees on our system now cook electrically in their own homes.

Our companies, for years, have followed the practice of merchandising only those appliances which we do not believe have yet secured general public acceptance—hence our concentration, at the present time, on the sale of the electric range and the electric water heater, which are not yet sufficiently established in popular favor to be profitable merchandise for the dealer. We are vigorously promoting this load because the present public demand for low residential rates is quickly and antomatically met as soon as cooking and water heating by electricity is introduced, and the customer becomes a user of energy in quantities, let us say, in excess of 5,000 kw.-hr. a year. At the rates already in effect under private operation, this earns the customer a price for energy that is satisfactory and appealing. It raises the value of the service to a new plane and strengthens the bond between the utility and its consumers in a measure that cannot be accomplished by the use of light and small appliances, despite the benefits they bring, because they do not earn the rate.

It is our opinion that the development of this kitchen load rests primarily upon executive support in the provision of an adequate budget, a balanced sales program and manpower to do the selling. Local methods may vary. Free wiring, dealer financing, trial periods, rentals or other measures that have proved effective may be adapted to each situation.

The main thing, however, is to set up liberal policies that will build the market and then rally the strength of the entire organization behind this program.

To Merchandise Small Appliances

Improvements in performance offer wide appeal — Offers the best approach to one-half the domestic market — But selling must be organized in a consistent, balanced program of continuous selling

By D. M. DeBARD
Stone & Webster Service Corporation, New York, N. Y.

THE small appliance market has been neglected for the last ten years by the power companies. These devices were the first merchandise the industry had to sell to the home, and when the larger appliances came along, offering a larger load, they were crowded to one side. Except for the flatiron, they have received scant attention. But the time has come, I think, when we can well afford to put some thought, time and money behind them. In fact, we can't afford not to.

There are several conditions which make this desirable and necessary. In the first place real improvements have been made in the performance of these labor-saving appliances and there is a greater variety than ever before. Modern design and the wide diversity of the services they render have built up a breadth of appeal that we have never had before. And then they offer the answer to that pressing problem of the minimum bill customer.

Here are about half of our domestic consumers paying us no profit because this consumption is so small. Something must be done about it. And

something can be done. We can sell them a cooker, coffee maker, kitchen mixer, casserole, hot plate, waffle iron, toaster, heating pad or some other useful and labor-saving device. We can sell them, because so many of these table cookery appliances have a practical utility value that makes them a sensible purchase for people of small spending margins, and for the thousands who live in small quarters or take many meals outside and are not in the market for a regular range.

The trouble has been that these devices have been looked upon as of secondary importance. But they are really primary for half of our domestic market. And they are essential to building up a well rounded electric service in the home. This point too frequently is forgotten.

It is worth while, therefore, to take it seriously and really organize to do this job, by providing for continuous selling. It has been the practice in the past to feature certain devices in special campaigns each month. This is good selling, because it has extra promotional value, but often, once the month was over, that appliance has been forgotten. But the selling of these small appliances should be so set up that the campaign month is used not only for a selling drive but to build up a big prospect list for that appliance which can be followed up in the succeeding months, while other devices are being featured in the seasonal campaigns.

In this selling, of course, the dealer must be tied in at every step. These appliances are attractive merchandise for a wide variety of stores and it is our job to make them popular. We must build demand so that they will be sold in increasing volume from every neighborhood store that carries equipment for households.

To do this calls for planning and personnel and advertising, for adequate attention in the budget and the sales program, so that the small appliance has its proper place in the balanced load-building operation. But success is sure to any company that will make a serious effort, because there are so many prospects. And it should not be forgotten that this load is carried on the top rate.

Small appliance selling calls for a high degree of merchandising technique and lots of dealer distribution

Selling the Unprofitable Customer

How Atlanta has turned 12,000 minimum bills from red to black — The solution of the problem lies in the approach and the supporting policies

By CHARLES A. COLLIER
Vice-President Georgia Power Company. Atlanta, Ga.

IN SEPTEMBER, 1933, the Georgia Power Company supplied retail service to 106,361 residential customers. By September, 1934, the number had increased to 118,596, in the same territory. This increase of 12,235 in large part represented customers who had discontinued service during the depression for financial reasons. They were small users and came into our classification of unprofitable customers. Notwithstanding this the total number of customers using less than 30 kw.-hr. per month actually decreased from 46,785 in September, 1933, to 45,466 in September, 1934. The total customers using less than 50 kw.-hr. per month, however, was approximately the same in each of the above months. Which, in effect, means that we have taken these 12,000 unprofitable customers and brought them up to a use of more than 50 kw.-hr. per month.

Five factors have made this possible —an attractive residential rate which gives more electric service for the customer's minimum charge and encourages him to increase his consumption; active merchandising of low-priced major appliances; employee selling of small appliances; home-lighting instruction and promotion, and effective advertising of both rate and appliances.

Since September, 1933, we have given special attention to the sale and promotion of low-priced, high-quality electric ranges, refrigerators and water heaters to the small families of moderate income who constitute the bulk of our unprofitable customers. Of 9,214 refrigerator units, 2,222 ranges and 1,016 water heaters sold by Georgia Power Company during the first nine months of the year approximately 50 per cent were in the low-price group. But small appliances are the only load-building equipment which many of our minimum bill customers can afford to buy. So since special crews selling small appliances only cannot always support themselves in our territory, this company has been most aggressive in promoting employee selling in this field.

One of the most successful of our all-employee selling activities was a ten-week electric iron campaign conducted during the past summer. We set a quota

[*Continued on page 76*]

Nine Months of Merchandising

An Analysis of Appliance Sales by 100-Odd Selected Power Companies, for First Three Quarters of This Year Compared With 1933

APPLIANCE selling has been speeded up this year throughout the power industry. Right down the line the pressure has been put on. More salesmen, more advertising, more merchandising to build more load.

To measure this acceleration in the sale of domestic equipment a survey has been made of more than 100 power companies to compare the results of their merchandising activities through the first nine months of 1934, against the same period last year. The tabulation on the opposite page presents the figures. In 74 company listings, something over a hundred operating companies are covered, since in some cases the companies in an entire system are combined. On the last line fourteen other companies, engaged in direct merchandising operations, are bulked. These 100-odd companies serve about 10,400,000 domestic consumers, or about half the industry.

The sale of electric refrigerators by those utilities in the first three quarters of this year showed an increase of 27 per cent over the same nine months of 1933. Range sales increased 124 per cent. They sold 152 per cent more water heaters, 20 per cent more clothes washers, 73 per cent more ironing machines and 34 per cent more miscellaneous small appliances, in which vacuum cleaners, flatirons, sewing machines, heat pads and all the table cooking devices have been included. The total dollar value of the appliances sold by these companies during this period this year was up by 37 per cent. The number of domestic consumers that had been added figured 12 per cent over September 30, 1933. The number of salesmen employed by these companies on domestic load building increased 16 per cent and the expenditure for the advertising and promotion grew by 29 per cent.

Of course the big impression that these figures give is the fact that a vast amount of merchandise is being sold. The total of 111,492 refrigerators, 40,977 ranges, 14,564 water heaters, 54,453 clothes washers, 11,713 ironing machines and 616,203 small appliances represents a lot of selling; in fact, $37,558,062 worth. Likewise, 4,782 salesmen is a big selling force and $2,693,247 a lot of money for advertising for half the industry.

But in studying the relationships involved and comparing the results that are being secured by the different companies, it is the lack of achievement by some companies that is the striking feature, judged by what others are accomplishing. The total dollar value of appliance sales varies from $21.11 per customer to 68 cents. That is a wide difference, as you measure the performance of a sales department that is endeavoring to merchandise this equipment to homes. The average for the group was $5.39. Part of the explanation is reflected by the comparison of the number of consumers per salesman in these territories. It ranges all the way from 26,423 to 641, and the expenditure for advertising varies from $1.33 to 6 cents per residence customer. And all this has something to do with the fact that the average annual domestic consumption in this group runs from 1,605 to 376, influenced largely, of course, by the degree to which electric cooking and water heating have been developed.

Man-power and contact with the customer gets the business

It does not appear in the tabulation, but the number of appliances sold per salesman goes from 1,350 to 31. This, of course, is a crude measure, because some companies listed sell no small devices and in a few cases do not merchandise some of the larger appliances. The footnotes under the tabulation point out a few other special conditions that affect these averages. But in the main it all emphasizes again the amazing lack of uniformity in selling policies and standards.

Reports from seven other companies, not included in the tabulation, are also interesting. This group is actively promoting dealer sales and therefore their own sales represent but a part of the direct results of company appliance promotion activities. They serve a total of 1,567,638 domestic consumers, an increase of 2 per cent in the past twelve months. Their average annual domestic consumption runs from 1,206 to 456. They employ 327 salesmen this year on domestic promotion, against 345 in September, 1933. But they have increased their total expenditure for advertising and promotion in this field from $237,154 for the first nine months in 1933 to $313,927 in the same period this year. In this group in 1934 there is an average of 4,794 domestic consumers per salesman and an average expenditure of 20 cents per consumer for advertising. In these seven companies they vary from 11,096 to 1,887 consumers per salesman and in advertising expenditure from 15 to 53 cents per domestic customer. No attempt has been made to estimate the volume of appliances sold in these seven territories. Their reports of dealer sales are not complete.

Appliance Sales by Power Companies

Total Sales of Domestic Appliances by More Than 100 Power Companies in the First Nine Months of This Year, Compared With the Same Period in 1933—Embracing Over Ten Million Consumers —With Data on Average Consumption, Number of Salesmen, Expenditures for Advertising

Company	Refrigerators Units Sold		Ranges Units Sold		Water Heaters Units Sold		Clothes Washers Units Sold		Ironing Machines Units Sold		Flatirons and Small Appliances Units Sold		Total Sales of Appliances	Total Domestic Consumers	Appliance Sales per Customer	Av. Annual Domestic Kw.-Hr. Consum.	No. of Salesmen	Consumers per Salesman	Advertising Expenditures	Adv. per Consumer
	1934	1933	1934	1933	1934	1933	1934	1933	1934	1933	1934	1933	1934	1934	1934	1933	1934	1934	1934	1934
1.	743	705	56	29	48	29	319	392	42	36	30,732	28,840	$215,916	108,920	$1.99	538	28	3,900	$8,637	$0.08
2.	2,074	2,355	540	444	231	148	699	817	160	208	15,416	11,866	620,331	129,234	4.80	653	73	1,770	34,253	0.27
3.	498	754	62	72	5	2	200	267	48	21	2,910	2,710	157,451	40,370	3.92	388	18	2,240	6,219	0.15
4.	1,936	1,916	854	423	368	77	403	10	11	3	5,588	4,538	631,336	52,185	12.20	658	29	1,800	.....	.....
5.	1,020	610	9	14	.....	.....	32	73	5	17	2,485	2,995	329,896	86,090	3.83	593	37	2,330	20,000	0.23
6.	245	288	161	80	25	10	59	20	1	.....	1,657	1,073	105,871	27,442	3.86	492	12	2,280	16,565	0.60
7.	303	180	84	45	45	5	178	294	8	13	903	842	112,699	32,748	3.44	455	15	2,180	6,145	0.19
8.	124	186	7	12	4	1	167	45	13	7	.....	.....	47,500	35,023	1.35	376	10	3,502	2,400	0.07
9.	765	467	41	21	2	2	813	751	11	19	2,357	1,870	287,945	46,171	6.23	551	40	1,150	.....	.....
10.	897	334	216	17	74	3	301	123	27	17	2,084	1,674	289,085	43,411	6.69	494	18	2,400	11,398	0.26
11.	1,004	1,235	196	108	89	12	416	356	83	41	3,583	3,079	464,954	78,518	5.90	584	27	2,900	30,640	0.38
12.	205	124	110	44	8	19	150	136	49	64	4,802	4,985	91,954	58,518	1.57	628	15	3,900	19,523	0.33
13.	381	410	44	26	2	.....	378	399	38	41	2,633	2,525	225,649	28,664	7.90	553	19	1,510	7,840	0.27
14.	767	409	615	110	29	12	566	219	150	37	2,027	2,115	340,703	46,311	7.38	455	31	1,490	13,683	0.30
15.	1,995	1,757	657	32	90	.....	1,161	785	411	145	11,603	8,520	895,502	145,676	6.15	661	113	1,290	53,400	0.37
16.	1,901	1,168	377	462	48	62	[1]301	445	77	228	.....	.....	518,183	125,108	4.12	536	35	3,575	8,110	0.06
17.	1,407	901	[2]997	164	[2]449	4	747	1,182	28	39	.....	.....	542,603	94,202	5.75	689	50	1,880	54,109	0.57
18.	861	663	39	36	.....	4	173	157	2	4	953	1,097	207,125	24,094	8.40	400	13	1,850	4,331	0.18
19.	1,950	1,612	396	282	138	45	1,494	1,173	276	202	15,364	10,955	616,762	299,348	2.06	605	28	10,140	97,000	0.32
20.	2,577	2,077	753	401	227	29	1,510	797	487	125	6,284	5,687	1,003,233	155,813	6.50	634	175	890	62,104	0.40
21.	4,667	4,884	.....	.....	.....	.....	3,230	2,716	923	398	83,521	81,025	2,477,043	753,147	2.73	740	603	1,250	432,495	0.57
22.	997	768	300	78	16	5	768	846	126	90	25,152	16,904	449,831	193,092	2.32	617	69	2,800	.....	.....
23.	825	608	100	23	1	1	243	260	29	23	1,309	767	257,384	23,512	10.90	615	16	1,454	8,837	0.37
24.	1,172	815	112	49	42	14	513	357	42	20	1,570	1,688	408,456	44,916	9.10	620	48	935	.....	.....
25.	484	263	564	276	578	182	312	173	102	34	2,836	2,001	295,077	97,793	3.02	1,014	26	3,760	24,930	0.25
26.	440	507	20	18	.....	.....	249	188	29	21	395	[3]383	158,459	29,071	5.45	398	6	4,845	.....	.....
27.	9,214	3,364	2,222	281	1,016	60	703	131	244	28	30,274	12,371	1,902,000	119,508	15.90	803	177	675	64,109	0.58
28.	906	777	2,033	453	27	28	764	711	290	109	20,377	14,606	512,623	475,625	1.75	694	18	26,423	65,757	0.14
29.	647	183	484	170	256	158	447	260	96	77	.....	.....	278,360	64,846	4.30	464	37	1,750	26,786	0.41
30.	2,261	1,776	1	4	.....	.....	172	184	35	33	1,257	1,358	410,565	95,170	4.30	585	25	3,800	.....	.....
31.	369	342	13	3	.....	2	.....	.....	13	41	4,684	1,910	134,652	41,242	3.28	605	26	1,570	20,049	0.49
32.	733	498	906	779	460	336	257	134	55	24	3,877	3,310	264,978	70,266	3.68	912	35	2,000	9,715	0.13
33.	968	595	1,295	233	105	31	1,248	812	270	90	6,200	4,700	495,552	66,451	7.50	481	40	1,660	15,244	0.23
34.	148	133	157	103	24	.....	205	178	72	60	2,224	1,015	89,567	35,602	2.52	638	11	3,236	26,615	0.73
35.	389	228	41	129	10	14	348	751	67	95	1,552	1,220	217,325	53,491	4.07	690	10	5,349	.....	.....
36.	1,554	968	187	121	10	8	680	446	136	89	4,053	4,048	410,344	144,495	2.84	428	62	2,325	26,800	0.18
37.	2,437	2,565	953	495	336	330	1,457	1,128	170	143	12,112	12,759	1,027,040	300,363	3.25	500	190	1,580	58,533	0.19
38.	1,607	1,424	481	64	83	1	1,451	1,763	614	335	22,000	18,600	617,007	231,046	2.68	621	61	3,780	64,000	0.28
39.	277	180	88	49	53	37	211	161	24	24	2,903	1,376	105,451	19,642	5.36	562	16	1,220	4,339	0.22
40.	575	483	369	324	310	318	765	723	161	151	2,294	2,150	257,497	43,668	5.90	1,236	27	1,620	33,738	0.77
41.	64	72	79	45	1	3	88	42	8	9	1,168	543	41,922	61,387	0.68	519	10	6,139	9,077	0.14
42.	3,179	3,516	62	43	.....	.....	6,531	3,685	1,618	467	30,863	25,568	1,621,056	702,000	2.30	500	220	3,190	.....	.....
43.	3,825	5,269	1,850	1,000	79	80	2,811	2,794	721	512	16,674	18,320	1,456,490	555,896	2.64	463	266	2,100	64,223	0.11
44.	162	189	133	53	.....	.....	51	62	4	23	.....	.....	68,726	46,402	1.48	525	5	9,280	6,286	0.13
45.	6,650	1,335	2,929	496	1,423	78	406	239	24	17	28,122	10,331	1,449,285	92,341	15.60	612	100	923	95,000	1.03
46.	827	842	79	65	6	.....	201	204	48	59	1,685	1,244	292,297	82,732	3.54	530	11	7,500	25,255	0.30
47.	407	559	889	229	611	177	87	66	17	16	14,852	2,330	310,876	61,079	5.10	751	42	1,450	81,000	1.33
48.	3,763	4,245	1,169	184	463	68	2,285	1,290	423	200	24,782	16,397	1,315,065	528,065	2.48	645	215	2,440	146,041	0.28
49.	1,212	1,651	44	46	4	9	1,469	1,631	385	247	4,257	4,109	458,522	156,842	2.92	466	[4]68	.....	20,692	0.13
50.	789	914	250	166	54	42	.....	.....	46	38	.....	.....	265,591	101,502	2.62	443	34	2,965	15,030	0.15
51.	793	447	110	45	83	16	54	22	4	3	2,644	1,216	204,341	23,969	8.55	554	8	2,999	6,625	0.27
52.	449	535	258	126	14	8	588	497	189	41	4,178	3,662	250,794	42,110	5.95	540	12	3,500	9,348	0.22
53.	1,036	920	180	107	64	61	406	281	199	75	30,946	23,068	.....	243,116	.....	753	120	2,020	94,286	0.39
54.	2,387	1,137	1,293	923	347	358	750	452	116	62	2,391	1,902	294,464	35,600	8.25	1,250	40	890	15,932	0.45
55.	3,856	2,292	960	443	452	84	288	24	58	4	11,205	3,417	877,523	74,164	11.90	788	26	2,840	17,306	0.23
56.	2,785	2,014	160	85	7	1	874	571	165	132	3,548	3,125	922,463	68,327	13.50	620	85	800	14,496	0.21
57.	412	261	494	292	58	55	.....	.....	30	33	.....	.....	146,975	50,130	2.93	537	20	2,500	6,306	0.12
58.	319	325	38	40	.....	4	198	79	.....	.....	2,167	653	107,624	18,920	5.67	486	14	1,350	13,288	0.70
59.	1,345	1,278	3	.....	.....	.....	2,161	2,188	719	445	11,045	7,883	658,540	278,493	2.36	730	26	10,711	26,346	0.09
60.	1,113	666	520	144	160	15	118	88	2	2	3,982	2,929	312,413	34,107	9.16	606	28	1,220	19,634	0.57
61.	550	499	79	51	45	30	50	2	13	1	3,593	419	176,083	15,636	11.30	676	6	2,606	.....	.....
62.	111	52	201	80	56	3	.....	.....	.....	.....	1,070	815	58,447	13,179	4.44	641	11	1,190	5,714	0.43
63.	199	127	409	53	303	84	32	22	3	4	1,036	982	67,256	16,577	4.05	729	11	1,507	14,133	0.85
64.	1,108	1,053	799	500	108	15	323	156	43	14	1,865	1,444	485,990	88,261	5.56	736	34	2,590	60,550	0.69
65.	608	554	97	27	5	7	24	41	7	17	1,416	1,668	135,821	38,695	3.50	564	10	3,870	6,013	0.15
66.	40	54	2	1	.....	.....	84	122	4	7	229	132	27,650	5,596	4.95	420	4	1,149	2,500	0.45
67.	73	61	99	21	31	1	55	49	25	2	.....	.....	54,985	10,487	5.28	515	4	2,622	3,662	0.35
68.	3,406	2,551	1,715	790	368	211	2,417	1,361	484	191	6,199	4,342	1,253,354	273,614	4.60	632	250	1,090	[5]91,402	0.33
69.	1,827	2,258	1,423	479	1,116	91	883	1,427	168	267	9,159	8,246	689,577	296,289	2.39	586	140	2,118	59,000	0.20
70.	431	286	319	185	678	115	452	333	228	152	3,170	1,295	298,587	50,275	5.96	1,605	24	2,080	40,769	0.81
71.	240	179	799	8	45	.....	101	52	13	14	4,008	3,038	182,954	93,068	1.96	531	36	2,580	7,385	0.08
72.	2,165	2,165	435	433	382	729	1,089	1,830	133	297	8,067	5,306	673,294	31,419	21.11	616	49	641	.....	.....
73.	2,595	1,876	168	116	49	4	2,248	2,308	76	25	9,304	7,831	1,004,250	220,992	4.58	716	183	1,207	70,138	0.31
74.	338	487	[6]771	[4]471	[6]513	[6]180	1,353	1,826	77	101	.....	.....	374,000	194,997	1.92	637	58	3,362	60,000	0.30
75.	10,267	7,731	5,621	4,006	1,830	1,258	1,937	1,167	238	137	32,609	17,663	2,546,938	1,189,150	.....	602	323	.....	247,506	.....
Total	111,492	87,911	40,977	18,227	14,564	5,776	54,453	45,274	11,713	6,766	616,203	457,440	37,558,062	10,405,709	[7]$5.39	622	4,782	[7]2,992	2,693,247	[7]$0.35

†Mass totals of 14 additional companies. [1]Sales to July 1, 1934. [2]Includes some rentals. [3]Flatirons only. [4]Sell gas appliances also. [5]Includes commercial. [6]Includes some dealer sales. [7]Average.

Tupelo Revenue Increases

Residence Customers Now Using 89 Kw.-Hr. Per Month at Average Rate of 2.31 Cents

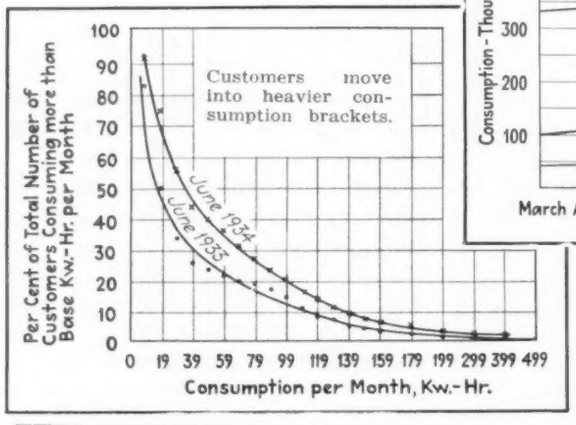
TUPELO, MISS., set out on the new T.V.A. service and rates on February 7, 1934. Seven months' results are now available and show that total revenues have increased from $5,732 in March to $8,867 in September. The residential revenue increase was from $1,200 to $2,060 from the 974 and 1,005 customers in March and September, respectively. Average consumption per residence customer grew in the same period from 42 to 89 kw.-hr. per month, an increase of 112 per cent, bringing the value of 76 per cent above the 1933 national average monthly value.

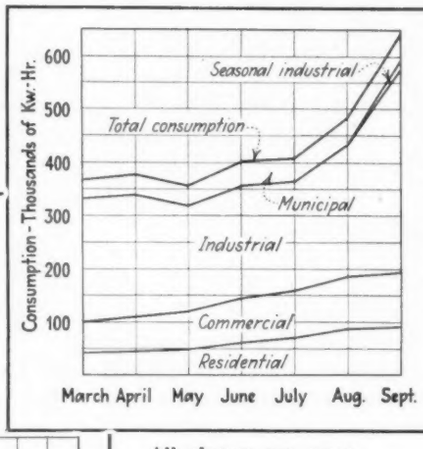
Commercial use by 321 to 352 customers has likewise grown from 183 to 289 kw.-hr. for which they paid a total of $2,544 in September, as against $1,752 in March.

Two reports have been issued. The October report does not include operating expense data. The August report showed that the four months (March to June) revenue was $23,708.78 for 1,506,693 kw.-hr. sold. Out of this T.V.A. shows 13.6 per cent of revenue accruing as a net addition to surplus in the tabular report. In other words, the difference between revenue and power purchased for this third of a year was at the rate of more than $41,000 per year. Much of this enlarged margin is apparently due to added industrial load formerly carried by Mississippi Power Company.

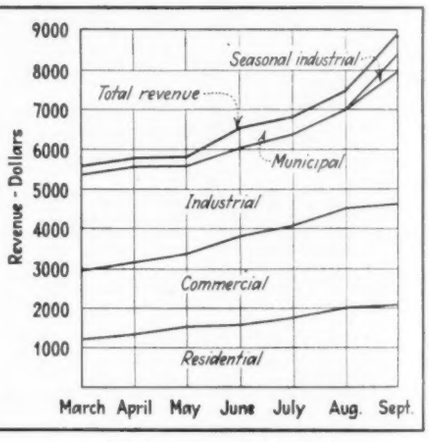
These reports of Edward Falck, T.V.A. rate engineer, state that operating expenses, exclusive of power purchased, have not increased in proportion to the increase in revenue, consequently the increased volume of sales, original and new, has given the increase in net available.

Four months operation adds 13.6 per cent to surplus at Tupelo


Per Cent of Total Number of Customers Consuming more than Base Kw.-Hr. per Month
Customers move into heavier consumption brackets.
June 1934
June 1935
Consumption per Month, Kw.-Hr.

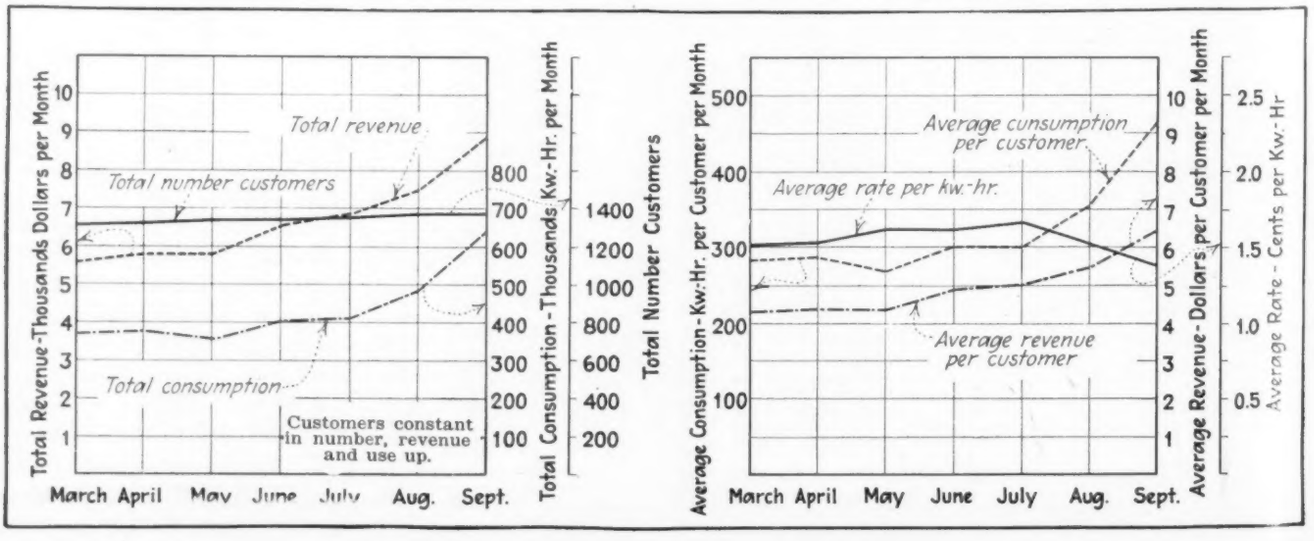


All classes use more under T.V.A. rate.



Increased revenue all along the line.

Average rate for all classes of customers. Average residential rate for September was 2.31 cents, commercial 2.51 cents, industrial 0.878 cent, seasonal industrial 2.53 cents, municipal 1.03 cents. All classes average 1.39 cents.


Total Revenue-Thousands Dollars per Month
Total revenue
Total number customers
Total consumption
Customers constant in number, revenue and use up.
Total Consumption - Thousands Kw.-Hr. per Month
Total Number Customers
March April May June July Aug. Sept.
Average Consumption - Kw.-Hr. per Customer per Month
Average consumption per customer
Average rate per kw.-hr.
Average revenue per customer
Average Revenue - Dollars per Customer per Month
Average Rate - Cents per Kw.-Hr

Duct Splices Save Money

Estimates Showed That About $60,000 Could Be Saved in Rerouting 63,000 Ft. of 66-Kv. Cable by Using Duct Splices

By **HERMAN HALPERIN**
Cable Research Engineer
Commonwealth Edison Company, Chicago

IN CONNECTION with the widening and repaving of South Chicago Avenue in Chicago it was necessary for the Commonwealth Edison Company to abandon some conduits and to move the cables into new ones. As this diagonal street has been used considerably for underground lines, and is so to be used still more in the future, the most economical type of construction was essential for the new conduits. This meant that the average conduit length between manholes would have to be increased from the past value of about 350 ft. to the present standards of 500 to 600 ft. wherever street conditions would permit. With the longer lengths the number of manholes and also the number of joints and accessories were correspondingly reduced for the lines reinstalled this year, as well as for the lines to be installed in the new conduits in future years.

The cables to be rerouted were operating at 4 kv., 12 kv., 20 kv. and 66 kv. For the lower voltage classes it was obvious that the lengths of the removed cables could be joined together by duct splices in order to make them into the proper lengths for the new conduit sections, since duct splices to go into 3½-in. ducts had been used on 20-kv. cable for about ten years and for longer periods on the lower voltage cables. But no occasion had arisen previously to require duct splices for 66-kv. cables. In considering such a new problem it would be necessary to determine whether the duct splice would successfully withstand the pulling strains and the normal accelerated aging test for 66-kv. cable.

For the 66-kv. cables to be rerouted, there were therefore two plans: Either to purchase new cable for installation in regular 4-in. ducts wherever necessary and to put the removed cable into stock, or to develop a duct splice for use in joining the lengths of the removed cable. It was estimated that the use of the duct splice where feasible on the 63,000 ft. of 66-kv. cable would result in a saving in cash outlay for the work on South Chicago Avenue of about $60,000. It was recognized that the 66-kv. duct splice would require 5-in. ducts, but it happened that no additional cash outlay was made necessary on this account, since there was a sufficient quantity of such ducts in the company's stock.

Material for 750,000- or 1,000,000-Circ.mil., One-Conductor, 66-kv. Duct Splice

Material	Amount	Location on Drawing
Copper sheath sleeve	1	A
750,000 or 1,000,000-circ.mil. straight split connector	1	B
½x0.022-in. copper braid, ft	120	C
½x9-in. No. 30 gage copper strip	2	D
½-in. low loss varnished cloth tape, yd	36	E
¼-in. low loss varnished cloth tape, yd	216	F
1-in. low loss varnished cloth tape, yd	396	G
Cotton yarn, oz	1	H
Insulating oil (same as taping compound), gal	½	J
Taping compound, qt	1	K
Wiping solder, lb	15	L
Triangle solder, lb	4	M
0.10x½x9-in. lead strip	2	N
Pasters	15	—
Candle	½	—
White wipers, lb	5	—
Soldering flux (stick)	1	—
Soldering flux (paste), oz	2	—
Gasoline, gal	3	—
No. 17 steel wire, ft	3	—
No. 50 coarse sand cloth, ft	5	—
No. 150 fine sand cloth, ft	5	—

Items E, F, G and H to be furnished submerged in taping compound (Item K).

For shielded cable omit copper strip (Item D).

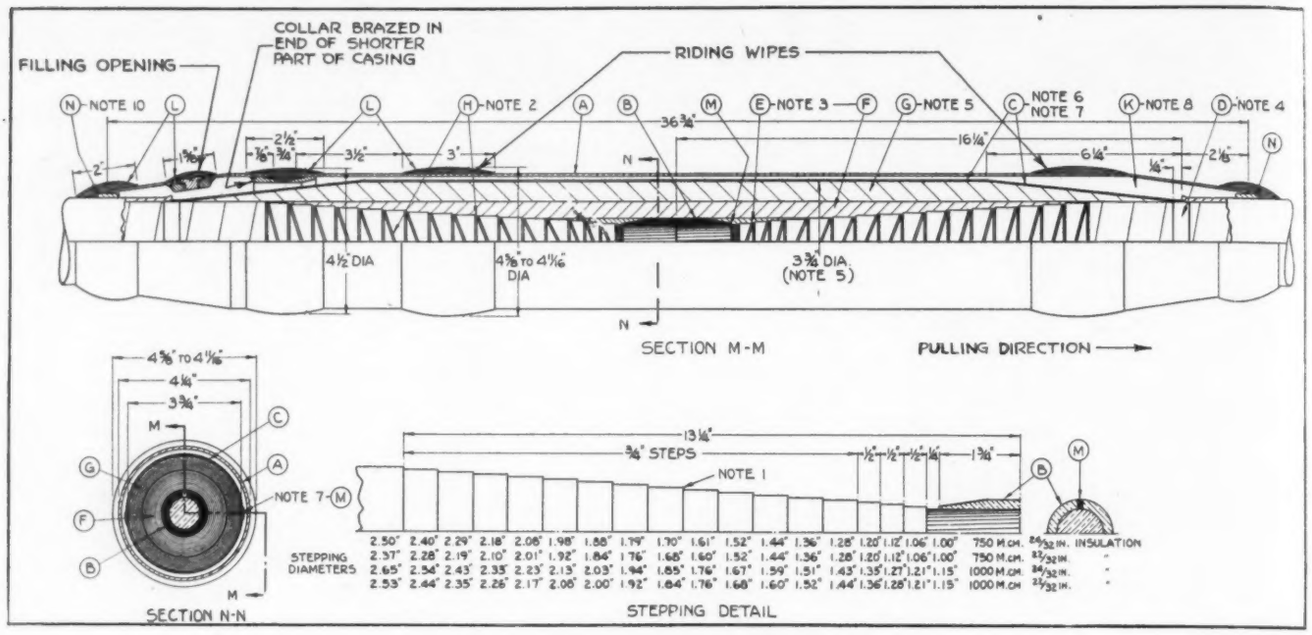
For 1,000,000-circ.mil cable omit lead strip (Item N).

Nature of 66-kv. duct splice

The design of the duct splice adopted after several tests is similar to the design of the 66-kv. joint used in Chicago, which has had a very satisfactory operating record. In order to keep the diameter of the splice at a minimum, the casing was made of seamless copper tubing. This procedure permitted the use of a small wall thickness ($\frac{3}{32}$ in.) and still had the required tensile strength for the pulling strains and internal radial forces incidental to heating of the cable and the attachment of parts for filling plugs. To protect against corrosion, the casings were heavily tinned. To prevent abrasion of this protective coating during installation of the cable two dummy riding wipes were placed near the ends of the long casing after development work indicated this method to be the best procedure. These dummy wipes were applied in the shop and were cut down to the required diameter of $4\frac{5}{8}$ in., leaving a clearance of $\frac{3}{8}$ in. to the inside of the ducts.

Duct splices tested for strength

Two trial duct splices were built on some pieces of 66-kv. cable in the field and subjected to severe pulling conditions by pulling them through a 5-in. duct 619 ft. long, which was unusual in the number and severity of its bends. The splices were placed about 30 ft. apart, near the pulling



How the 66-kv. duct splices were made

This splice is for 750,000 or 1,000,000-circ.mil single-conductor cable. The following notes detail the method of construction:

1. Step the insulation by tearing the paper tapes against piano wire. Apply taping compound to each step.

2. Wrap one complete turn of cotton yarn adjacent to connector ends and one turn adjacent to each insulation step. Flush with insulating oil heated to 125 deg. C. Apply taping compound to each step.

3. Wrap half-lapped layers of ½-in. tape to the surface of the connector, continue with butt-lapped layers of ⅝-in. tape diameter of the cable insulation. Apply taping compound over each layer. Flush with insulating oil heated to 125 deg. C. after one-third and after two-thirds of the steps have been taped over. Apply taping compound after each flushing.

4. Insert copper strip, with the ends butted, and solder to sheath in three places equally spaced around cable. Solder end of braid to strip and sheath. Remove outer layer of cable insulation. Flush with insulating oil heated to 125 deg. C. on shielded cable, omit the copper strip and tear shielding tape and outer layer of insulation ¼ in. from end of sheath. Solder braid to shielding tape and sheath.

5. Continue taping with butt-lapped layers of 1-in. tape to a diameter of 3⅜ in. Apply taping compound over each layer.

6. Apply braid half-lapped over slopes and one-third lapped on straight portion. Trim and solder trailing ends.

7. Apply ⅜-in. strip of solder lengthwise over braid in two places equally spaced. Flush with insulating oil heated to 125 deg. C.

8. Evacuate joint for fifteen minutes, make vacuum tests for five minutes and back-fill with degasified taping compound heated to 105 deg. C.

9. Apply pressure of 25 lb. per square inch for five minutes and examine for leaks. Allow ½ hour minimum cooling with the compound supply connected.

10. When connecting 1,000,000-circ.mil cable the lead strip shall be omitted.

When connecting a 750,000 to 1,000,000-circ.mil cable the stepping dimensions for each cable shall be as shown in detail.

end of the cable length. Each splice was built close to the duct mouth in the manhole, in order that there would be no bending of the cable at the wipes of the splice after its completion. Connecting, taping and shielding of the insulation in the splice followed normal jointing practice.

After the casing was wiped in place it was evacuated through the single filling opening and back-filled with a heated, degasified oil having approximately the same viscosity characteristics as the cable compound. Vacuum and pressure tests were made for possible leaks. In pulling the cable and completed splices through the duct, using the regular cable lubricant, the maximum pulling strain as indicated by the dynamometer was only 1,000 lb. No signs of damage of the sheath at the duct splice wipes or injury or leaks in the casings or wipes were found.

As the cable was drawn out of the duct a short length containing each duct splice was cut out and taken to the company's high-voltage laboratory. The two pieces were then connected in series with a regular 66-kv. joint and potheads were installed on the ends. Insulating sleeves were placed on the sheaths in order that power factor characteristics could be obtained on each one of the three joints, as well as on a short length of cable. Accelerated aging tests were made at 2½ times normal voltage; that is, 95-kv. conductor to sheath. With the use of an insulated circulating current transformer the setup was heated by conductor current to approximately 65 deg. C. for eight hours daily and allowed to cool to room temperature for the remainder of the 24-hour periods. Power-factor measurements were made at room and elevated temperatures throughout the tests.

Results of eleven days of testing indicated that the electrical strength of the splices would be at least equal to the strength for the regular 66-kv. joints, if the splices were lengthened slightly. The initial results obtained in the testing showed that the pulling strains may result in some slight void formation between the applied varnished cambric tape and the vertical portions of the steps in the factory insulation. In order to provide an ample factor of safety, the length was increased 4 in. for the final design.

Minimizing interruptions during rerouting

In order to minimize the duration of outages of the important lines involved incidental to the rerouting work much of the cable removal and reinstallation work was done in periods of three to six days over week-ends. The field forces worked continuously night and day during each of these periods. It was necessary to have the line which had the largest amount of cable to be moved out of service for about a month for the construction work.

Rerouting of the 66-kv. cable consisted first of preparation of the new 5-in. ducts by swabbing thoroughly and testing their cleanliness by pulling through a 4¾ in. x 6-ft. lead mandrel. When a line was removed from service the old joints and reservoirs were removed and the cable was

[*Continued on page 96*]

Savings Recover Motor Cost

New Substation and Added Wiring Outlay Avoided by Leading Power Factor Capacity in Compressor-Drive Motor

By C. B. SCHAFER
Safety Plant
Libbey-Owens-Ford Glass Company,
Toledo, Ohio

W. V. GORTON
Sales Engineer
Westinghouse Electric & Manufacturing Company, Toledo, Ohio

SOME seven years ago the Libbey-Owens-Ford Glass Company built a plant, after extended research, to manufacture safety glass. As more general acceptance of this product was built up, additional plant capacity was required and production methods were vastly improved through the development of specially designed electrically driven machines. Power for these was provided through a 6,600/550-volt transformer substation.

The electrical load thus gradually built up until during the night shifts it was close to the 750 kva. capacity of the transformers; the load, in other words, was around 380 kw. with a power factor of slightly more than 50 per cent. A bank of capacitors was then installed, which reduced the night operating kva. to 456 and raised the power factor to 86 per cent. During the daytime the demand was less, as there were comparatively few lights burning.

At this time greatly increased demand for 1933 model automobiles with safety glass called for the addition of new factory space with corresponding increases in electric power and lighting. This apparently meant a parallel bank of transformers in the substation. A study of new equipment requirements indicated that the new kva. added to the existing amount would total about 820 with a power factor of 81 or 82 per cent. No further extensions to this substation would be made as future additions would require power through a different substation.

Synchronous motor chosen for air compressor

Included in this new equipment was an air compressor to be driven by a 100-hp. motor. This would be operating continuously whenever the plant was running and the possibility of substituting a synchronous motor for an induction motor showed that if this had enough margin of capacity to afford sufficiently leading power factor the demand could be reduced to within the capacity of the 750-kva. substation. When the costs of synchronous motors were checked it was found that a considerable saving over capacitors could be made by going the whole distance with the synchronous motor. The efficiency of the synchronous motor was found to be the same as the corresponding induction motor, so no losses could be charged against this procedure as compared to capacitors.

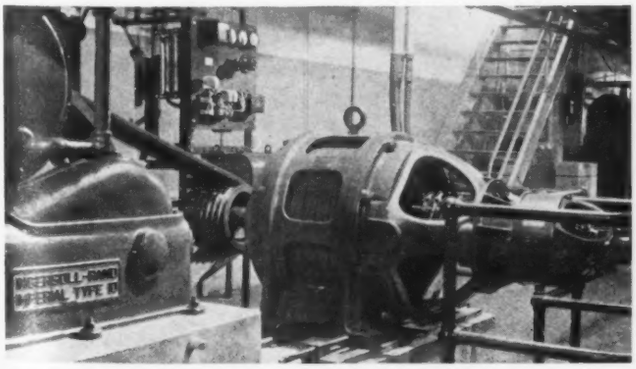
The accompanying tabulation indicates the expected results, condition 1 being the load before the addition of the new equipment, condition 2 that with all induction motors, and conditions 3, 4 and 5 with various leading power-factor synchronous motors to drive the compressor.

The synchronous motor under condition 5 could be credited with two factors for improving power factor. First, by the elimination of an induction motor from the compressor about

[*Continued on page 98*]

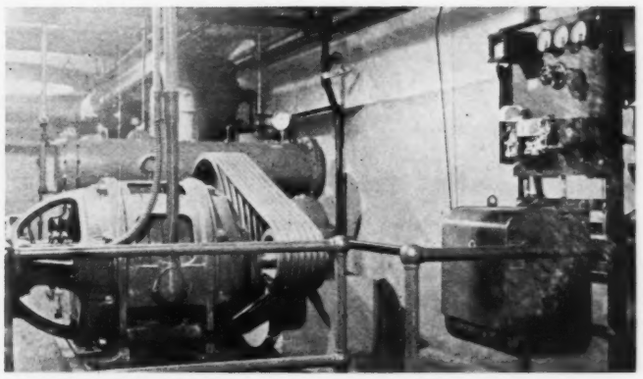
Overexcitation Makes Power-Factor Savings

	Condition	Maximum Kva.	Power Factor per Cent	Cost Increase Over Condition 2
1	Present night operation	456	86	.....
2	With new motors (all induction) and lights	820	81.5	.....
3	Substitution of 100 per cent power-factor synchronous motor	795	84	$430.00
4	Substitution of 80 per cent power-factor synchronous motor	767	87	530.00
5	Substitution of 60 per cent power-factor synchronous motor	740	90	800.00



Overexcited synchronous motor drives compressor

Operation of this 100-hp., 1,200-r.p.m. motor at 60 per cent power factor improved plant power factor and saved 80 kva. of capacity. This is one-minute exposure during operation and indicates clearly the smoothness of operation by the steadiness of the V-belt drive



Semi-magnetic reduced voltage starter with resynchronizing relay

connecting motor and compressor. The reduced voltage semi-magnetic starter with automatic resynchronizing relay shown permits easy starting without undue current inrush.

Federal Power in Northwest

Enormous Excess Capacity Being Installed—No Power Policy on Sales Yet Announced—Mixed Trends Evident—Watch, Wait and Fight for Square Deal Is the Private Utility Policy

OUT in the Northwest two major federal power projects are under way on the Columbia River. The Grand Coulee project, with 520,000 kw., will add 2,280,000,000 kw.-hr. of potential energy at 50 per cent use factor to the region at an estimated investment of $63,000,000. The Bonneville project, with 430,000 kw., will add an additional 1,880,000,000 kw.-hr. of energy on the same basis at a cost of $55,000,000. The first is to be completed in 1937 and has already been allocated $15,000,000 of P.W.A. funds. The Bonneville project is to be completed in 1936 and has been allocated $32,000,000 of P.W.A. funds.

Seven major utility systems in the Grand Coulee area had an output of only 3,307,000,000 kw.-hr. in 1933. Three major utility systems in the Bonneville area had an output in 1933 of 1,069,000,000 kw.-hr. There is a large excess capacity already available in these systems and Grand Coulee will make the excess 250 per cent and Bonneville 400 per cent. This is the general situation confronting all interested in power development in this region.

Within a 300-mile radius of Grand Coulee and Bonneville the existing demand on private and municipal plants totals about 765,000 kw. The generating capacity already in operation in this circle is about 1,255,000 kw., or almost double the existing demand. The existing capacity is 282,000 kw. in municipal plants and 973,000 kw. in private plants. The existing load is 133,000 kw. for municipal and 632,000 kw. for the private plants.

The initial installation at Grand Coulee will add 108,000 kw. and, together with the 86,000 at Bonneville, gives an added total of 194,000 kw. The ultimate capacity at Grand Coulee is 520,000 kw. and at Bonneville 430,000 kw. In addition the city of Seattle is proceeding with the installation of equipment already purchased to add 110,000 kw. at Diablo. These figures give an idea of the task involved in absorbing this capacity in a reasonable period of time.

It is not likely that a federal power program would be proposed which would threaten the existence of the municipal plants, which already have enough generating capacity to take care of growth for a considerable period. It appears inevitable that the federal developments would be used to furnish customers now served by the private utilities unless the Administration alters its power policy and adopts one of only generating and selling power in excess of the demands on the privately owned systems.

But, unlike the T.V.A., these projects are being built without any announced policy or program for the disposal of the power. A state planning council has been appointed in Washington to study the entire power situation and undoubtedly will make some recommendations as to these federal projects. This new council has committees appointed to study power use in irrigation, to study the possibility of industries to use metals, wood and chemicals in the area, to study how power can be sold to private and municipal agencies and to study the possibilities for home heating by the use of electric power. These studies should help, but no federal agency is studying the situation or appears concerned with the disposal of the power. These projects are as yet treated as relief projects by the government.

Ross plan for action

As a solution to power supply in western Washington, J. D. Ross proposes that the city of Seattle act as intermediary to purchase all the properties of the Puget Sound Power & Light Company, other cities and districts to take over their part of the system later at cost-plus additions. The banking associates propose to pay $99,000,000 in 5 per cent City Light bonds and Mr. Ross suggests a modification to $95,000,000. The outstanding securities of the utility are given at $131,878,995 by Mr. Ross and the price advocated he states to be in excess of the present market value of these securities. The plan proposed offers the alternative to cash payment on condemnation and liability for severance damages by piecemeal acquisition, states Mr. Ross, and the proposed bonds would be retired out of earnings.

This proposal has been sent to Mayor C. L. Smith and the Council of Seattle with request for favorable action. Mr. Ross states that federal funds to Seattle have been refused and that Seattle should act on its own resources. He states that competition and duplicate systems are wasteful and not in the public interest. He makes a definite argument against state or federal ownership and management and points out that federal projects appear to be developing as competitors, and that P.W.A. gave money to eastern Washington only. Home rule for power is best according to Mr. Ross, and he states that "the present conditions of the depression make it possible now to buy the system at a price below what the courts would award after years of costly condemnation proceedings." The report is a combination of argument and financial data and has not received any official action. It has created great interest in indicating public sentiment in the territory and is quite critical of the federal government and its practices in developing power in the Northwest.

Also, the celebrated Bone bill received approval of Washington voters at the recent election, although a similar bill failed of approval in Oregon. This authorizes cities having municipal plants to extend their lines through the state and to furnish

service at wholesale and retail inside and outside of incorporated villages and towns—all this on an untaxed and unregulated basis.

A brighter side of the picture is a growing sentiment in favor of taxation of all tax-exempt property, including municipal plants, and this may extend to the federal projects. Politicians are saying that Grand Coulee power will cost 2 mills at the switchboard and taxation on privately generated power is already 3 mills. A much fairer competitive situation will exist, therefore, if there is tax equality. The states need the tax money.

Several alternative possibilities

In view of these conditions it is apparent that private utilities in the Northwest face a difficult situation. It may develop along several lines:

1. Under the Bone bill and in line with the Ross plan the municipals may buy out the private utilities at a fair price.

2. The state itself may go into the power business to wholesale to municipalities.

3. Taxation and regulation of the municipals may make private competition possible.

4. Federal projects may be developed slowly and the power sold to existing private and municipal agencies.

5. Some form of T.V.A. program applied to the federal projects may be instituted, but this does not appear probable in the face of the opposition of the municipal plants to federal ownership and operation.

6. It may be possible to absorb the added power. This is more or less of a visionary idea. Already the use of power for domestic purposes is two or three times the national average, rates already are very low and have been utilized to develop all possible loads. So far as industrial power is concerned it is true that natural resources in minerals, wood products and chemicals exist, but despite aggressive efforts and low rates no large industrial developments have occurred. The generally radical political sentiment in the region, the lack of markets, the high taxes and a very unsatisfactory labor situation are handicaps to industrial development that are difficult to overcome. Thus with a full development of domestic, commercial and industrial business already had, it is difficult to see how the excess power can be absorbed other than by population growth. Major possibilities, however, lie in home heating and irrigation, especially the former, if the power is dumped on the market.

The sane view of the Northwest power situation is that before any considerable power is produced by the federal government an agreement will be worked out that will be beneficial to the consumers and the existing private and municipal utilities. Undoubtedly the federal government will face a developmental period of unprofitable operation, for the only alternative would be ruthless competition with the private and municipal utilities.

The final answer lies in load growth. The bringing in of industries and their development through rate subsidies, the use of power for irrigation and agriculture, the use of power for heating—herein lies the answer to the use of the excess power.

In the meantime both private and municipal utilities regard those federal projects as an invasion and are vigorously combating any destructive power policies. In addition they are hard at work developing business. The general public in the region welcomes the enormous federal expenditures, and yet the influence of needed taxes and the action of militant utility investors in the territory may put a check upon any very radical program. On the whole, private utility executives in the area are optimistic and are vigorously trying to get a square deal on power.

Wide World

Grand Coulee Dam on the Columbia, 75 miles west of Spokane, will rank next to Boulder Dam

One of a Series of Intimate Talks with Industry Executives

Mayer on the Wiring Outlook

An Interview by

EARL WHITEHORNE

MOST families enjoy their differences of temperament and opinion. It has been so in the family of national associations within the electrical industry. The contractors and the power companies are naturally far apart in their background and at times as opposite in their inclinations as blue and white seidlitz powders. Over the cost of wiring, the use of new wiring materials and the revision of the National Electrical Code there has been frequent conflict and both sides have probably benefited. For progress comes that way.

Because the utilities are large organizations and strong and they are for the most part individuals and small, the contractors have invoked the forces of a united purpose, vigorous expression and aggressive leaders. Leo E. Mayer, president of the White City Electric Company of Chicago, has been one of these. As head of the National Electrical Contractors Association for six years, he has championed the installers of wiring in the councils of the industry and made a fine contribution to the advancement of his trade in a period of unparalleled difficulty.

He has maintained his association throughout the long drag of the depression, when 90 per cent of the contractors' business has dried up. He has brought his group successfully through the travail of establishing a code, which he is now administering as chairman of the Code Authority. He stands the courageous captain of this vast army that provides the wiring over which electric service must travel.

"If the electrical industry is going to regain its former position of prosperity and employment," he said to me the other day, "it must stop looking to the outside for help. It must go to work itself, with all branches of the industry pulling together for a common purpose.

"We have been accused of having a chip on our shoulders," he continued with a smile. "Maybe we have had. We are now happy that the merchandising of appliances is generally on a much improved plane of competition, that rate schedules are more generally going promotional. And there is another thing that contractors have perhaps been too slow to recognize. When the electric light and power companies are down the entire electrical business suffers. It is far better, under such circumstances, to forget grievances and strive to help the utilities.

"The things that disturbed us during good times are insignificant in the face of today's struggle to make a living and to rebuild our industry. Such co-operation, of course, presupposes desire on their part to co-operate with us and recognition of the responsibility of our national association in matters of concern to us.

Resell old customers

"The pre-depression growth of our industry was in the main accounted for by the addition of new customers to the power companies' lines," Mayer said. "We might just as well face the fact now that that phase of our business is gone. It is true that new construction will once more return to its former volume, but not for several more years. So it is obvious that the industry as a whole cannot just wait for something to happen. It must create its own opportunity and build its own prosperity again.

"It can be done," he declared. "Every other business has been able to turn to its old customers and resell them. Why haven't we? We have wired more than twenty million buildings in the past forty years or more. Why can't we reinspect old installations and rewire them where they need it?"

Mr. Mayer is convinced that a great new forward movement in our industry can be developed out of a proper reinspection procedure. Obsolete wiring systems now prevent the full use of electricity, impair the service and run up the cost of fire insurance. A conscientious reinspection program would lead inevitably to modernized installations and increased load. To do this job of making wiring adequate and safe will create a large volume of business in wiring materials and appliances, in which the entire industry will participate. He feels that nothing should be permitted to hold back this development—in the public interest—and that a program should be organized at once with all groups co-operating.

"Also, the new promotional rates for electric energy and the new prices of ranges bring us face to face with the biggest market for electric cooking we have ever had," Mr. Mayer said. "It is our opinion that lower cost in range wiring can be more positively achieved through management and production methods than through new materials with somewhat lower safety factors. But we would like nothing better than to sit down with the power people to work out a mutually satisfactory answer to the problem. It might also be possible in today's market for the contractor to help in changing over to outdoor meters and with farm line construction at considerably less investment than will be required in a year or so.

"Our association has now the greatest membership in its history. We propose to justify this membership by an active effort for the rebuilding of the business of the electrical industry. We would like to fit our plans with other organizations in order to secure the greatest benefit to the industry and will welcome their co-operation."

Such an attitude certainly holds fine promise for the future. It should bring an honest response from the other groups in these matters of great mutual interest.

LEO E. MAYER, president of the White City Electric Company of Chicago and of the National Electrical Contractors Association, who has fought the battle of the contractor through the turbulent period of the depression and by courageous, forceful leadership brought him new strength and recognition.

ELECTRICAL WORLD

L. W. W. MORROW · EDITOR

PUBLISHED EVERY OTHER SATURDAY BY
McGRAW-HILL PUBLISHING COMPANY, INC.

VOLUME 104 ESTABLISHED 1874 NUMBER 16

DECEMBER 8, 1934

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Legal Action Indorsed

FOR some time there has been a growing sentiment in the light and power industry favoring a more aggressive attitude toward government competition. Recent happenings indicate that recourse will now be had to the courts with the T.V.A. as the major project for legal battles. The resolutions of the trustees of the Edison Electric Institute, the announcement of Mr. McCarter, with the accompanying opinions of Messrs. Baker and Beck and the decision of Judge Grubb, all indicate the necessity for a legal adjudication of the points in dispute as well as the strong constitutional position of the utilities. It is to be hoped that the cases will be tried in the courts and not in the newspapers and that the presentation used by both the T.V.A. and the utilities will be evidential instead of argumentative.

It is necessary and advisable to explore the legal aspects of the T.V.A. project and to make available to the utilities whatever legal protection the courts can afford for their legitimate interests. But, in the long run, the utilities cannot rely upon a defense based upon the constitutionality of governmental acts. In the end the case will be lost or won in the court of public opinion.

For the T.V.A. is more significant than a power development. It has grown into social objectives that meet a favorable public acceptance, even though power sales are subsidized and other purposes seem more ideal than practical. Public support, however, will be given until the facts are demonstrated that prove the present purposes wrong, because the appeal to the public is based upon the endeavors of government to raise standards of living.

Thus it will not be enough to prove the case for the power industry in the courts. There must be affirmative moves also. The utilities should show the maximum ability of electric service and equipment to raise standards of living and that this does not necessitate governmental operation nor the injury to private enterprise and initiative that now seems to be a premise for the projects of the government. The utilities should develop their own yardsticks as well as show the false premises and illegal features of the governmental yardsticks. The industry should support the legal action and yet should put forth maximum effort to win the more important battle through services that will in the end prevail in the court of public opinion.

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There Is a National Rate

MANY have contended there can be and should be no single rate for electric service. Of course not, as a uniform charge in cents per kilowatt-hour. But there can be and is a national rate-characteristic curve which graduates the charge to the use of service—merely the low-price-for-large-volume principle of economics. However, hardly any two companies choose the same method of shaping their charges to establish such a logical curve. That is the curse of the rate situation. Only the intransigeant extremist would urge a uniform way of expressing the rate for all communities and all classes of service—even the government in its yardstick experiments will relish freedom to try various rates to ascertain their relative promotional effectiveness. But even a conservative mind could stand the passing of a few of the stray rates that perpetuate the rugged individualism of the rate economist.

How can proponents of these vestigial rates be persuaded to help move rates away from hash and heterogeneity? Preaching and praying have proved futile. Perhaps publicity would reveal facts that would convince. There are upward of 10,000 rate schedules published and applied by the electric utilities of the country. These should be assembled and analyzed to display their common denominators and uncommon departures. For example, one might make a plot of the relative frequency of occurrence of each monthly charge in dollars or cents for 15 kilowatt-hours. Similar studies could be made for 25, 40, 100, 250 and 500 per month. That would show a predominant value of monthly bills for each consumption for the whole country. Plotting the bills for the respective consumptions would give the national characteristic monthly bill curve; division would give the national characteristic rate-per-kilowatt-hour curve. Twenty million consumers can hardly be wrong if they complacently subscribe to a rate which has such logical response to the economics of volume, no matter how much they may be aroused to argue about the level at which these charges fall.

That is not all. Each of the specific consumption curves could be analyzed to determine the proportions of each kind of rate structure that appears in the charges which give the most frequent monthly charge for that particular monthly usage. Right there would show up which are the "stray" rates that could just as well be superseded by one of the more prevalent types which experience has shown will produce the same results in revenue and perhaps better results in public understanding. Further analysis might well show that

the dominant type of rate schedule for small domestic consumption is quite different from that which applies to the larger consumptions. That would confirm what rate experts have always contended—that promotional success calls for promotional urge.

There is no need for the industry to go to the heavy expense of collecting and digesting these data. It has already borne the expense of collecting them for the rate surveyors of the Federal Power Commission. When that body, in reporting to Congress, makes the purely factual analysis which it has promised, it might well extend the study into these suggested channels. That would be a helpful contribution to utility operation, to regulation and to a public understanding why rates are what they are, but not exactly what they might be in method of expression.

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The Cure for Hit-or-Miss Selling

IN STUDYING the analysis of domestic appliance merchandising activities of the 100-odd power companies tabulated in this issue one point stands out. There is an amazing lack of uniformity in selling policies and standards among the power companies. In operating practice certain efficiencies are expected and demanded, and the station that consumed four times as much coal per horsepower as its neighbor would not be permitted to do it long. Construction costs are measured by accepted figures based on a wide comparison of experience. Meters on the system must show a fair record of accuracy or something is done about it. But with selling it has been every man for himself, and do the best you can.

In the merchandising of domestic appliances, of course, the character of the community has a big influence on what can be sold and how much. But, after all, it is a matter of selling comfort and labor saving to homes, and people are people. One city may present a greater opportunity than another, but there are limits to the divergence that can be justified. When the appliance sales of one company average 68 cents per domestic consumer against $21.11 in another city, it is not the community but the selling that is to blame. And when one company operates with one salesman to 26,423 connected homes and another has one selling man to 641, and when the expenditure for advertising runs all the way up and down from 6 cents to $1.33 per residence customer, then it is evident enough that no guiding standard is being followed.

Efficiency only comes when men know what constitutes good performance and strive for it, and it is as easy to set up standards in selling as in engineering or construction. Such a contrast in commercial practice is tolerated only because the industry has not yet made any orderly effort to compile a record of experience and find out what constitutes a good job under different conditions.

New Man-Power and the Power Industry

MOST, if not all, of the difficulties now besetting the power industry are susceptible of resolution and will be resolved. There is, however, one danger that most power groups are heedlessly plunging into that is bound to give trouble and that is the very real danger of a loss of man-power, properly trained and equipped to man future executive and operating posts.

Inquiry among a group of engineering school heads reveals the astonishing fact that while they have placed most of their recent graduates, comparatively few of these are entering the electrical power industry. Meanwhile, time and technology march on. It is true there is as yet no lack of man-power, but the men on the firing line are in most cases being used harder than ever before. These men represent by and large the proportion of brain and man-power that the industry attracted and attached to itself one, two or three decades ago.

It may be difficult to justify the adding of new graduates on the payroll. But other men in the less skilled and trained groups have been added as a matter of necessity. The question is: Can the industry afford not to take to itself at least a fraction of its normal share of the year-to-year crop of trained brain and man-power? If it looks to its future, it would not appear so.

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Insull Jury Says "Not Guilty"

SAMUEL INSULL has been acquitted by a jury of his peers. With sixteen of his associates he stands cleared of the charge of having used the United States mails in a scheme to defraud. Quite evidently, from remarks made by them after their discharge, the members of the jury concluded early in the trial that the defendants were the victims of the times. The "depression" was guilty, not Samuel Insull, *et al.*

There was much animus against Samuel Insull following the collapse of his holding companies. The picturesque aspects of his flights and concealments kept him and the industry identified with him in the center of a mockingly vindictive spotlight for a long time. Apparently the American people clamored for Samuel Insull's head. At any rate that idea was easily to be inferred from the exceeding bigness and blackness of type in the Insull headlines. Then the quarry was taken and interest fell, as it does always when the chase is ended. When Mr. Insull was returned to Chicago and was held in jail while bond was being raised for him the comment was frequently heard that the government was unnecessarily "pushing around" a man 75 years old.

The pendulum had completed its swing. A voice more authoritative than that of the mob has been heard. The public is fair when it weighs the evidence.

NEWS OF THE INDUSTRY

Walsh Refuses Data Asked by Maltbie

New York Power Authority declines to submit to Public Service Commission survey evidence for use at rate hearings — Regulation methods attacked

The New York Power Authority declined this week to submit to the Public Service Commission for use in rate proceedings the information and data supporting its recent report on distribution costs in which it held that electric rates in the state were almost one-third higher than was warranted.

In a nineteen-page reply to a letter from Milo R. Maltbie, chairman of the commission, Frank P. Walsh, chairman of the Power Authority, stated that to comply with the request would be a surrender by the Power Authority of its functions to another body set up by the state for purposes entirely outside the scope of those imposed upon the authority by law. "It would also give the private utility companies, with which we are directed to negotiate contracts," Mr. Walsh said, "an unconscionable advantage in bargaining for the power. Moreover, it would involve the data and engineering staff of the Power Authority in the confusion and intricacies of rate cases based upon practices which our law specifically forbids us to follow."

It was also held by Mr. Walsh that it was the view of the authority that "it would be a distinct disservice to residential and rural users of electricity in that it would have a tendency to prolong, if not perpetuate, the excessive rates now being charged the people of the State of New York for electricity."

Sharply attacking the present method of utility regulation, Mr. Walsh declared that it "has become more and more the first line of defense for the utility companies when their unjust exactions are challenged."

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Banker Warns Investors to Weigh Public Ownership

Investors should scrutinize the aspect of public ownership of utilities, says Edward K. Woodworth, chairman of the committee on public utilities of the National Association of Mutual Savings Banks, in the *Savings Bank Journal*.

"If the declarations of the President in Mississippi and Alabama are to be taken as a prophecy of ultimate public ownership of the power industry, savings bankers and all other classes of investors must see that the transition does not involve the sacrifice of values largely owned by the people themselves," said Mr. Woodworth. "Among the reasons which induced legislatures to make public utility bonds legal investments for savings banks, and which also led us to purchase them as the guardians of the people's savings, was the well-justified belief that freedom from wasteful competition under effective regulation had become a settled principle of our economic life. Immunity from confiscation we took for granted."

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3 per Cent Tax Voted for New York Utilities

With the affixing of Mayor LaGuardia's signature last Wednesday, the three-point tax program enacted by the New York Municipal Assembly, providing $58,000,000 for relief, became law. Under the provisions of the measure utility companies will pay the city 3 per cent on their gross incomes in 1935, with payments required monthly. This tax falls entirely upon the companies since the administration dropped its earlier proposal to tax the bills of utility consumers. The bill provides specifically that the 3 per cent tax is in addition to all other taxes paid to the city by utility companies. The estimated yield from the utility tax is $15,000,000.

Utility companies, heretofore, have paid the tax, formerly amounting to 1½ per cent of gross, under protest. Although representatives of the companies have failed to comment on the tax following its passage, George B. Cortelyou, president of the Consolidated Gas Company, had expressed his disapproval while the measure was still under consideration. Mr. Cortelyou stated that the tax "presents a situation vitally affecting our customers in the city, our employees and our stockholders." "If the tax were imposed," he continued, "Consolidated Gas Company and its affiliated companies would be forced to consider increases in rates or curtailment of many phases of our present service in order to reduce expenditures, of which wages are an important part. Neither course offers any element of public benefit . . . Under the law utilities are entitled to earn a fair return on capital invested in public service. Our companies are not now earning such a fair return . . ."

Paul Clapp Advocates Check on Federal Power Policy

At a meeting of the National Industrial Council, held this week in New York, Paul S. Clapp, vice-president of the Columbia Gas & Electric Corporation, declared that if private utilities received the same subsidies, including tax exemption, as public utilities they could supply electric current from 10 to 20 per cent cheaper than the Tennessee Valley Authority. Mr. Clapp told the council that up to September 1, 1934, the government had spent $280,000,000 on the T.V.A. and other utility projects, and that it must expend at least $3,000,000,000 ultimately to carry out its plans for power, navigation, irrigation and flood control on sixteen federal projects.

"The broad question transcends that of electric rates," Mr. Clapp declared. "I believe that unless the federal policy with respect to utilities is checked it will have a determining influence on the future course of government in its relation to all business." Discussing the subject of taxes, Mr. Clapp said: "This year the privately operated utility companies will pay $250,000,000 in taxes. If these companies were made tax exempt, as is true in large part of publicly operated utilities, and if this tax could be applied to reduction of domestic electric rates, the domestic electric bill of the nation could be reduced by 40 per cent.

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London Electric Companies Involved in Huge Merger

Six of the largest and most important London Electricity Supply companies have amalgamated to form a new company called the Central London Electricity Distribution Committee, Ltd., in a deal involving more than £10,000,000 and affecting a population of 500,000 in areas stretching from the Tower of London in the east to Hammersmith in the west, districts about 7 miles apart.

The companies involved are the Charing Cross Electricity Supply Company, Ltd., Westminster Electric Supply Corporation, Ltd., St. James & Pall Mall Electric Light Company, Ltd., Kensington & Knightsbridge Electric Lighting Company, Ltd., Chelsea Electric Supply Company, Ltd., and the Brompton & Kensington Electricity Supply Company, Ltd. J. A. Gatti of the Charing Cross company is managing director of the new combine.

Edison Institute Opens War on Administration's Power Plan

Baker and Beck, legal counsel engaged by President McCarter, hold T.V.A. act unconstitutional — Federal Judge in Birmingham attacks sale of power by Authority as primary object

Opinion founded on no less authority than the distinguished governmental careers of Newton D. Baker and James M. Beck is that the T.V.A. program, acts and policies are largely not within the constitutional powers of Congress to have delegated. This long-range projectile is manifestly the opening counter offensive of the electric utilities to the governmental barrage directed for many months at the industry. The decision of the Edison Electric Institute to start legal proceedings will call for its reorganization and, in addition, plans are being formulated for a conference with President Roosevelt.

Meanwhile District Judge W. I. Grubb in Birmingham gave heart to both utilities and the government's T.V.A. in refusing to halt the suit brought by fourteen preferred-stock holders of Alabama Power Company to prevent sale of properties to T.V.A. The latter are reported to take the attitude "as long as he doesn't enjoin us we don't care what he does," having "clearly defined the power of the federal government to undertake the development of electrical energy and its distribution." The utilities, on the other hand, are taking heart from these not uncertain statements in the decision "it has no power to produce and sell electric power, except as incidental to a granted power," and this is merely the disposition of a surplus from legitimate navigation and flood-control developments. The T.V.A. . . . "is engaged in producing and selling electric power in an enterprise having no substantial relations to the improvements of navigation or any constitutional power. . . " The T.V.A. administration, in the court's opinion, exceeded its authority in effecting the deal with Alabama Power Company and consequently the preferred-stock holders are entitled to the relief contained in having the contracts canceled and their future performance enjoined.

The Beck-Baker brief likewise represents that the T.V.A. provisions do not, in whole or in part, constitute a regulation of interstate commerce or a provision for national defense, but merely present a project for the federal government to embark in the power business. The enactment of the T.V.A. act of 1933 is flatly declared to have been beyond the constitutional power of Congress. Further than that, the act is viewed as usurping power reserved to the states and the people and expressly prohibited to the federal government by the Tenth Amendment.

These advisers go so far as to say that, even if the act were otherwise constitutional, it is debatable whether it does not involve an unconstitutional delegation of legislative power by the Congress. In any event, in the T.V.A. enterprise the governmental corporation is construed to be acting in a proprietary capacity and the attempt to withdraw all electrical utility property owned and used by T.V.A. from state or local taxation would be invalid. Finally, even if all the structural features could be reconciled with the Constitution, the arbitrary and discriminatory manner in which they are being carried on makes the programs, acts and policies unlawful.

Messrs. Baker and Beck conclude that the act does not authorize acquisition and operation of electrical distribution plants nor the activities of the Electric Home and Farm Authority; that Congress could delegate authority to build and operate transmission lines only to dispose of wholesale surplus power from a bonafide river control project; that erection and operation of intrastate distribution lines are not within the constitutional power of Congress to delegate and likewise for local farm lines.

Oblivious to these menaces to its tranquillity, T.V.A. announced that it had authorized the construction of the Pickwick Landing Dam on the Tennessee River. Without power house it is expected to cost $22,000,000. It is a ten-foot dam for navigation and flood control.

On another front the Alabama Public Service Commission has summoned the utilities to a December 11 meeting to

Taschereau Assures Utility Shareholders

Present-day attacks against our public utility companies have had the foreseen result. Their bondholders and shareholders are becoming nervous and want to throw their shares on the market. During the difficult times we are now going through this would be a disaster.

I am in receipt of appeals from widows, administrators of estates and religious communities asking me what they should do, for they have invested millions of dollars in these companies, in many cases all that they had, representing the economies of a lifetime of labor—the future of the family, their community.

I pray them not to become alarmed. If the result of the Lapointe *enquete* is one of readjustment of rates, that commission will, I am sure, bring an end to a campaign which, rightly or wrongly, perturbs, shakes public confidence which is so necessary to all financial enterprises.

And be it known too that the government will see to it that capital and popular savings are protected. I am firmly convinced that the leaders of the actual campaign do not entertain at all the desire to ruin either our institutions or our populace.

To all I say this: Remain confident and do not be afraid. Keep possession of your good stocks. They are in no danger.—*Statement issued by Premier L. A. Taschereau of Quebec at Montreal, November 20.*

discuss "the condition, and not the theory, which must be met" and suggesting that "the private utilities should make every effort possible to meet or reasonably approximate the rate standards now presented" by T.V.A. At Knoxville headquarters this is hailed by T.V.A. people as being a right-about face on the part of the Alabama commission, which has bitterly opposed the T.V.A. invasion.

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Insull and Sixteen Aides Acquitted in Quick Vote

Samuel Insull and sixteen codefendants, all accused by the federal government of alleged mail fraud incident to the collapse of the Insull utilities system in 1932, were found not guilty, November 24, by a jury in the court of Federal Judge James H. Wilkerson of Chicago, where the case has been on trial for eight weeks. The jurors reached their decision within two hours. The defendants were specifically charged with alleged violation of the postal laws by selling common stock of the Corporation Securities Company.

Judge Wilkerson's instructions consumed 80 minutes. The burden of proof, the court explained, was upon the government, and guilt must be established "beyond a reasonable doubt." "Before you can convict any defendant you must find that the evidence excludes every reasonable hypothesis but that of guilty of the offense charged," the court said. Then followed an explanation of the indictment. Those who were acquitted in addition to Samuel Insull were: Samuel Insull, Jr., Stanley Field, banker; Harold L. Stuart, Charles B. Stuart, Frank K. Shrader anl Clarence T. MacNeille of Halsey, Stuart & Company; Philip J. McEnroe and John F. O'Keefe, Corporation Securities Company; Fred H. Scheel, Robert W. Waite, Frank R. Evers, George A. Kemp, Utility Securities Company; Waldo F. Tobey, counsel for the Corporation Securities and director of Insull Utility Investments, Inc.; Clarence R. Whiteworth, Touche Niven & Company, auditors for the Corporation Securities Company, and Edward J. Doyle, president of the Commonwealth Edison Company.

Samuel Insull and his son must still face another indictment, charging them with violation of the bankruptcy act in transferring assets of the Corporation Securities Company when it was allegedly insolvent before it collapsed in April, 1932. No date has been set for trial of this case. Mr. Insull also faces trial on an Illinois charge that he embezzled $66.000 from the Middle West Utilities Company to protect a brokerage account of his brother Martin. He will be arraigned on the embezzlement charge on January 7.

Operating Problems Sifted at Wisconsin Meeting

Current diversion, interconnection of transformer and lightning arrester grounds, effects of lightning surges on secondary distribution systems and many other matters of daily operation of electric systems kept interest high at the technical and operating section meeting of the Wisconsin Utilities Association at Madison, Wis., November 22 and 23. Figures to support his statement that "weather conditions this year and last are again demonstrating in a concrete manner that the people of Wisconsin cannot depend upon water power for reliable electric service" were offered by Frank A. Robbins, Northern Power Company, retiring section chairman.

"If it is impossible to obtain grounding resistances of less than 30 ohms each, a gap should be inserted in the interconnection between the secondary neutral and the lightning arrester ground in such a manner that it will break down at a value of surge slightly less than that necessary to flash over the transformer." This recommendation by V. M. Murray and R. R. Benedict of the University of Wisconsin provoked spirited discussion. George Smail, chairman meter committee, reported on the methods of detecting current diversion, how suspects are handled, what and how adjustments are made, success in collecting bills, how bills are calculated, preventive measures adopted, extent of diversion and prosecution.

"Unquestionably we have developed our services to the point where physically they are well-nigh perfect—so much so that customers look upon perfect service as a matter of course," said O. C. Roehl, speaking on "Business Building." "We have not entirely met our sales responsibility," Mr. Roehl continued. "What we need most of all is a sales-minded spirit flowing through all our departments. A definite selling responsibility exists for every one in the business, and the fulfillment of that responsibility will greatly improve not only the financial standing of our companies but also improve our standing in the communities we serve."

G. F. Meyrick, Wisconsin Public Service Corporation, was elected chairman of the electric division, and Theron A. Brown, Madison Gas & Electric Company, vice-chairman.

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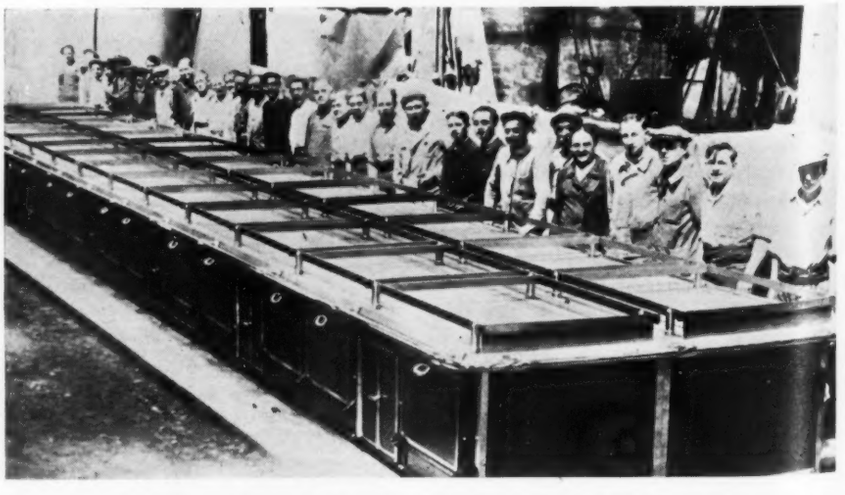
Hawk's Nest Hearing Set; West Virginia to Intervene

Preliminary issues in the federal government's suit to halt construction of the Hawk's Nest Dam on New River will be argued before Federal Judge George W. McClintic on January 7. The government asks an injunction against the Electro-Metallurgical Company, the New-Kanawha Power Company and the Union Carbide & Carbon Company of New York, charging the hydro-electric project will interfere with navigation in the New and Kanawha rivers.

Defendants contend that the New River is not navigable and challenge the constitutionality of the federal water power act in so far as it attempts to give the Federal Power Commission control over the river.

Attorney-General Homer A. Holt of West Virginia has announced that he will file an intervening petition for the state in the suit on the grounds that the state "naturally is interested in its water-power business."

FRENCH LINER'S GIGANTIC RANGE



Dedicated to the art of applying heat to food, this huge electric range was recently installed in the vast kitchen of the new French Line flagship *Normandie*, now nearing completion at St. Nazaire. The *Normandie* will sail from Havre on her maiden voyage to New York next May

A.S.M.E. Discusses Many Problems Incident to Steam Generation

Topics of interest at New York meeting included coal-burning capacity, flexibility and efficiency — Boiler-loss measurements, starting and stopping losses — Possibilities of binary cycles

At least six papers presented at the 55th annual meeting of the A.S.M.E. in New York City, December 3-7, were of particular interest to utility and industrial engineers concerned with power generation. Among announcements were: Flexible, efficient operation with powdered coal at Buzzard Point station; serious stoker maintenance when air is preheated above 300 or 350 deg. F.; burning 75 lb. of coal per square foot of grate surface per hour at Hudson Avenue station; the magnitude of starting, burn-out and banking coal consumption; methods of dissecting unaccounted-for boiler and furnaces losses, and possibilities of improving power-station efficiencies with binary cycles.

High-rate coal-burning experiences

Pulverized-fuel burning experience at Buzzard Point station was discussed by H. G. Thielscher, Washington, D. C. Fifty per cent of the ash is caught as slag in the furnace bottom and most of the remainder in the electrostatic precipitator. Individual tests at boiler outputs of more than 300,000 lb. per hour have shown less than 8 per cent combustible in the fly ash. Efficient burners and fine grinding are given chief credit for the high efficiency at high heat-release rates. With two duplex mills it has been possible to handle loads ranging from 35,000 kw. down to 5,000 kw. with swings of 5,000 kw. above and 2,000 below. Operation at 5,000 kw. is not without difficulties, as burners occasionally go out and require close attention at this low load. Two burners and one-half a mill are used to carry the lowest load.

During six months the boiler steaming efficiency averaged 84.6 per cent and the over-all efficiency 83.94 per cent, including coal for banking, starting, steaming and unusual operations. During this same period the plant burned 12,672 B.t.u.'s per net kilowatt-hour.

Robert E. Dillon and Melvin D. Engle, Boston, reported that up to 300 deg. F. the preheating of the air does not seem to increase maintenance of underfeed stokers above reasonable figures. But above this value there is a sharp increase of maintenance with air temperature. With chain-grate stokers there does not appear to be any consistent relationship between these values. However, it was reported that such stokers supplied with air and fuel for which they were designed can match underfeed stokers in coal-burning capacity and apparently operate with lower maintenance costs.

On test, the 15-retort stokers, installed in the Hudson Avenue station of the Brooklyn Edison Company in 1932, have burned Eastern semi-bituminous coal of about 14,000 B.t.u.'s at the rate of 75 lb. per square foot per hour for 48 consecutive hours at a steaming efficiency of 77 per cent, according to John M. Driscoll and W. H. Sperr. Each is equipped with 69 separately controlled air zones and has 694 sq.ft. of projected grate and ash-pit area. Cinder loss attains considerable magnitude at high burning rates.

Idling losses and binary cycles

Methods of measuring those losses usually included in "unaccounted-for losses" —hydrogen, hydrocarbon and carbon-monoxide losses—were described by P. H. Hardie and W. S. Cooper, Brooklyn. The completeness with which these losses were measured is evident from the low value obtained for radiation and unaccounted-for items of the energy balance.

Banking, lighting and burning-out coal consumptions of a boiler with a 13-retort, 25-tuyère 303.4-sq.ft. (projected area) Taylor stoker were reported by George C. Eaton, Boston. Banking tests showed the net banking charge to range from 3.44 lb. per hour per square foot of projected grate area 2.5 hours from the start of banking to 1.81 after 40 hours. Lighting tests showed a net charge of 76 lb. per square foot, and burn-out tests a net credit of 54.8 lb. per square foot.

Properties of the mercury-steam, diphenyloxide, aluminum-bromide and zinc-ammonium-chloride binary cycles, as means of improving power-station efficiency, were discussed by Gustaf A. Gaffert, Worcester, Mass. Using steam alone at very high pressures as a basis for comparison, he concluded that the ultimate in efficiency has not yet been reached.

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Utility's Policies Upheld

Citizens of Abilene gave the West Texas Utilities Company a hearty vote of confidence and approval in a special election held November 24 to determine the attitude of the citizens toward (1) the building of a municipal plant; (2) the granting of another franchise to an individual, and (3) the attitude of the people toward their present electric rates. The question of municipal ownership was defeated by a majority of more than three to one, with 1,269 voting against a municipal oil engine plant and only 397 voting for the project. The question of granting another franchise was defeated four to one. On the third question the citizens voted they are satisfied with the present rates by a majority of two and one-half to one.

EVENTS IN WASHINGTON

Legislative proposals certain to be made at the forthcoming session of Congress will deal with holding companies and with interstate transmission and power. Those who would curb the holding companies are far from the agreement as to the form their bill should take. There are many practical difficulties in the way of such legislation. Interstate transmission power is still under study, but Chairman Rayburn of the interstate and foreign commerce committee of the House of Representatives states in that connection that the Federal Power Commission is to be given additional duties.

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Active study of the conflicting application filed by the city of Lockport for the remaining 225 sec.ft. of water that may be diverted under the treaty at Niagara Falls has been begun by the Federal Power Commission. When the application was first submitted it was returned by the commission, which called for a large amount of additional data. Lockport authorities recently returned the materially revised application. The case is of unusual interest because it involves the whole question of municipal priority and also the question as to whether water itself can be licensed. The Lockport case is the only one where the license covers more than the site.

PAUL WOOTON,
Washington Correspondent.

COMING MEETINGS

American Engineering Council—Annual meeting, Washington, D. C., January 10-12. Frederick M. Feiker, executive secretary, 744 Jackson Place, N. W., Washington, D. C.

American Institute of Electrical Engineers—Winter convention, New York, N. Y., January 22-25. H. H. Henline, National Secretary, 29 West 39th Street, New York, N. Y.

Ruling Authorizes State to Enter Power Business

In an opinion handed down recently by Attorney-General G. W. Hamilton the right of the State of Washington to acquire, operate and maintain electric power plants and distributing systems without amending the state Constitution was upheld. The Attorney-General was asked for an opinion by the State Constitutional Revision Commission, which sought clarification of the question to remove any doubt as to the state's right to distribute power from the Grand Coulee project.

Ruling that there are no constitutional provisions which would restrict or prevent the state from engaging in the electric power business, Mr. Hamilton maintained that the state has the right to condemn property for public purposes, the only restriction being the ninth amendment to the state Constitution. That amendment requires compensation be paid for condemned property and gives to the courts the right to determine whether the purpose is public or private, regardless of any legislative declaration.

"The courts of most states have held that power plants are public utilities and that private property can be condemned therefore," the decision read. "The Supreme Court of this state has taken that position so frequently that it is not necessary to cite the cases."

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For Federal Loans on Electrical Appliances

A ruling has just been made by the Federal Housing Administration covering electric ranges, refrigerators, unit air conditioners and built-in kitchens, ventilating fans and oil burners to be financed by home loans. It reads:

The Federal Housing Administration has adopted a liberal attitude in passing upon these matters (equipment which is part of the real property) and is giving large discretion to the lending institutions. Upon the question of plugged-in refrigerators, we feel constrained to rule that refrigerators which may be detached by pulling out a plug could not be considered as approved equipment. In other words, in order to come within the approved list the equipment must be attached to the wiring in such a way that if it were attached there would be actual breaking or tearing from the permanent wiring system of the house.

This restriction would be the same for ranges and unit air conditioners, though air conditioners have also a plumbing connection. Meanwhile the Refrigeration Association of New York has standardized a junction box connection to bring such installations under the conditions which qualify for a loan. It carries the following specifications:

The leads for the refrigerator motor are connected and soldered to the work in a junction box, attached on the exterior of the refrigerator or within the motor compartment. Attached to and running from the junction box is a BX cable with which are the wires from the soldered connection of the junction box. At the other end of the BX cable is attached a regular BX elbow fitting, which is in turn fastened to the outlet box by means of a lock washer. The leads now coming through the BX elbow box plate and lock nut are connected to the house service by means of a soldered connection.

No other connection for ranges is equally acceptable.

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Frigidaire Officials Report Improved Conditions Abroad

"Business men abroad are carrying on with normal activity, with the result that payrolls are growing and people are obtaining much more income with which to buy." This is the opinion expressed by George D. Riedel, president and managing director of Frigidaire, Ltd., export organization handling Frigidaire equipment, upon his return from an inspection tour of the principal European cities and throughout Africa as far south as Cape Town. "People are doing things," he said. "They are anxious to improve their living quarters and their places of business. . . During the past nine months sales of household refrigerators, commercial refrigeration equipment for retail food and beverage sellers and air-conditioning equipment for both homes and business establishments has increased in an excellent fashion. . ."

Institute to Promote Small Appliance Market

A promotion plan has been adopted by the Electric Table Cookery Committee of the Edison Electric Institute to create wider interest in the promotion and sale of domestic appliances among all retail outlets. A "national better merchandising contest" will shortly be announced, featuring four quarterly periods, during which prizes will be offered to departmentalized stores, specialty dealers and utilities for merchandising performance.

All publicity and prizes will be restricted to manufacturers contributing to the national fund, their products and customers. Prizes will recognize best plans for sales training of retail clerks in selling "electrical housewares" and store-selling displays of small appliances.

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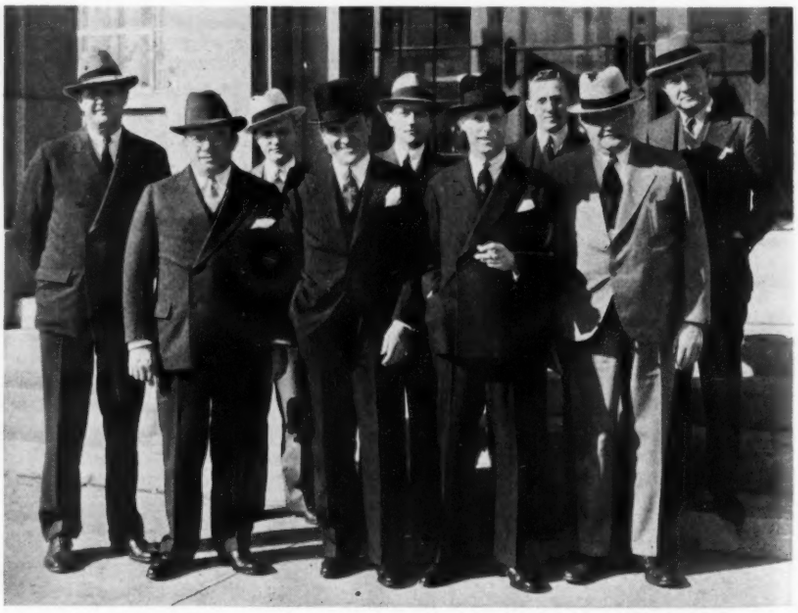
Ohio Insull Deal Approved

Application of four public utility companies to purchase four former Insull units in Ohio from the liquidator, the Chase National Bank of New York, has been approved by the State Utilities Commission. The companies are the Buckeye Public Service Company of Marion, Central Utilities Service Company of Marion, West Jefferson Power & Light Company and Asheville Power & Light Company. The purchasing companies are the Ohio Power Company, Dayton Power & Light Company, Ohio Public Service Company and Columbus Railway, Power & Light Company.



Frigidaire executives active in foreign fields were welcomed upon arrival recently in Dayton by officials of Frigidaire Corporation

Left to right: C. R. Osborn, General Motors Export Corporation; E. G. Biechler, Frigidaire Corporation; Robert DeMarse, Frigidaire Limited, New York; George D. Riedel, Frigidaire, Ltd., New York; G. P. Jolles, Frigidaire, Limited, New York; C. F. Dickson, Frigidaire, Limited, London, England; A. W. Porter, Frigidaire Corporation; W. F. Armstrong, Frigidaire Corporation, and R. Clark, Frigidaire, Limited, Paris, France.

Holding Groups Hit; Publicity Costs Revealed

In Part II of a report to the United States Senate covering its six-year inquiry into public utilities, the Federal Trade Commission summarized the utilities' efforts to obtain favorable publicity. Part I of the report was made to the Senate last month (ELECTRICAL WORLD, November 24, page 44). Estimating that at one time they spent as much as $30,000,000 a year for alvertising, the report declared that newspapers and "so-called newspaper agencies" were subsidized and that large sums were spent in the distribution of books and pamphlets. The National Electric Light Association was named in the report as the directing head of the propaganda campaign.

Charges that its investigation had established expenditures of $1,312,264 by utilities interests for "educational propaganda" over a period of years were contained in the third installment of the commission's report. The brief described the efforts of the utilities to "mold the thoughts and beliefs of the present and future generations" through the schools and colleges.

"Outside agencies" were discussed in another installment of the report. This part of the report tells of the utilities' activities among chambers of commerce, financial institutions, insurance companies, their contacts with state public service commissions, women's clubs, the Federal Power Commission, radio broadcasting, public speaking campaigns and work through organizations of utility employees.

While the commission informed the Senate that its financial set-up of holding companies was not complete, the report said that "enough has been disclosed to raise very seriously many questions not only relating to certain practices of holding companies but to the basic reasons for their existence. Reports in the record of its inquiry up to this time, the commission said, "show profits to holding companies running over 100 per cent in relation to the cost of the services rendered." This report anticipates the introduction of legislation providing for federal regulation of holding companies.

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Danville Loses Appeal

Upholding the decision of Judge Henry Leigh of Corporation Court, Danville, Va. (ELECTRICAL WORLD, November 24, page 42), the Virginia Supreme Court of Appeals denied last week the city of Danville's petition for a mandamus to compel Judge Leigh to sign an election writ on a proposed bond issue of $2,225,000 for the construction of a hydro-electric project at the Pinnacles in Patrick County. In its decision the high court maintained that the provisions of the Virginia recovery act, repealing a prohibition of the Virginia code preventing two elections within a year on the same bond issue, did not apply. In a previous poll the voters of the city rejected the bond issue.

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Sheldon Rejects City Plant

At a special election held November 27 after one of the most hotly contested elections in the history of the city, Sheldon, Iowa, turned down a proposition to build a municipal electric light plant by a vote of 845 to 681. Sheldon is served by the Iowa Public Service Company of Sioux City.

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Texas Assumes Control of Hydro Project

As a necessary step toward obtaining from the Public Works Administration an allotment of $30,000,000 to $50,000,000 for the construction of twelve dams and a number of hydro-electric plants on the Brazos River and its tributaries, the Texas Legislature has passed finally a bill placing the project under control of the state and creating a water control and reclamation district which embraces ten counties. An unusual feature of the bill is a provision which would prohibit employment on the construction project of any person who has been in the paid service of any utility company during the last five years, exemption from this provision being made as to technical engineers.

In addition to the Brazos River dams the Texas Legislature has just approved two other river developments. A partly finished Insull dam on the Colorado River 60 miles above Austin will be completed for $4,500,000. The Neches River will be dammed at Rockland at a cost of $7,000,000.

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Owners Must Exercise Power Site Rights

Owners of Oregon water-power sites must exercise their rights or surrender them to any one willing to develop them, according to a majority decision handed down by the Circuit Court of Appeals in Portland through Federal Judge James A. Fee. The decision was handed down in the appeal of the California-Oregon Power Company in its suit to enjoin the Beaver-Portland Cement Company from utilizing Rogue River water in a power development at Gold Hill. The ruling was interpreted to mean that power companies, which had bought up nearly all available power sites, will virtually be forced to develop their holdings immediately or lose them.

Municipal Plants Surveyed by Mississippi Committee

Municipal electric service is available in places having a total population of about 5,200,000, according to a summary of the final report on this subject by the Mississippi Valley Committee of the P.W.A. This supersedes several preliminary reports that have been published from time to time in recent weeks. The wording of the summary is, unfortunately, somewhat misleading and it is likely to be misquoted, for it states, first, that there are 1,745 places having municipal service with a combined population of 10,299,810, but follows this by the statement that the population of places in which the municipal plant supplies street lighting only is 5,060,681.

However, the number of meters in places for which data are available is given as 2,000,634, which points to the larger figure rather than the smaller, and may be compared with the number of customers of municipal plants reported in the 1932 census as 2,228,040.

There are 421 places with steam engine or turbo-generators totaling 1,186,076 kw.; 514 with oil or gas engine generators, 239,115 kw.; 138 hydro-electric, 527,304 kw. The whole number of places with generating plants, eliminating duplications due to more than one type, is 937, with a capacity of 1,952,495 kw. Places purchasing all energy used number 808.

The detailed list of places, by states, comprises a considerable amount of useful data, giving the population, year service was started, horsepower and type of prime mover, monthly average of purchased energy, and generator capacity in kw.

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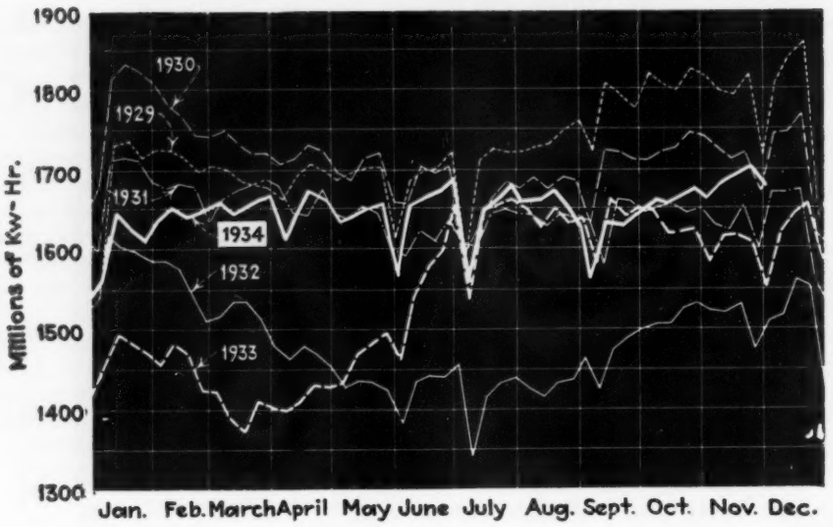
Los Angeles Asks Commission to Fix Utility Valuation

Plans of the city of Los Angeles, Calif., for the acquisition of the electrical generating, transmitting and distributing properties of the Los Angeles Gas & Electric Corporation in Los Angeles and Orange counties have been reported formally to the California Railroad Commission in an application asking the commission to fix the compensation to be paid for the corporation's electrical properties. E. F. Scattergood, chief engineer and general manager of the municipal Bureau of Power & Light, said the application is to institute proceedings for valuing the electrical system of the corporation.

The city's application to the commission follows the action of Los Angeles voters on September 27 in voting amendments to the city charter designed to facilitate the acquisition of the corporation's electrical properties.

Output, Rising, Matches 1930



Surpassing the corresponding production in any previous year except 1929, the output of central stations for electric light and power during the week ended December 1 amounted to 1,683,590,000 kw.-hr., against 1,705,413,000 in the preceding week, according to the Edison Electric Institute. The sag due to the holiday was unusually small. The gain over 1933 has been steadily expanding and now stands at 8.4 per cent. The upward trend since mid-September has been the steepest for any year covered by this series of weekly surveys of the industry.

Operations in every section of the country are ahead of last year, and in all except the Pacific states by a wide margin. Significant progress is shown by the great industrial regions in the eastern half of the country. Not long ago they were lagging behind or, in the Middle Atlantic, barely ahead of 1933. Now they exceed 1933 by 7 or 8 per cent.

Weekly Output, Millions of Kw.-Hr.

1934	1933	1932
Dec. 1...1,684	Dec. 2...1,554	Dec. 3...1,510
Nov. 24...1,705	Nov. 25...1,608	Nov. 26...1,475
Nov. 17...1,691	Nov. 18...1,617	Nov. 19...1,532
Nov. 10...1,676	Nov. 11...1,617	Nov. 12...1,521
Nov. 3...1,669	Nov. 4...1,583	Nov. 5...1,525
Oct. 27...1,677	Oct. 28...1,622	Oct. 29...1,533

Per Cent Change from Previous Year

Region	Week ended Dec. 1	Nov. 24	Nov. 17
New England	+ 7.0	+ 1.6	— 3.5
Middle Atlantic	+ 7.3	+ 4.1	+ 3.0
Central Industrial	+ 8.2	+ 5.3	+ 3.2
West Central	+ 9.7	+ 6.5	+ 1.3
Southern States	+15.6	+17.9	+15.6
Rocky Mountain	+12.8	+10.4	+ 5.6
Pacific Coast	+ 1.5	+ 1.2	+ 2.9
United States	+ 8.4	+ 6.1	+ 4.6

NRA Compliance Speeding Up

Recently published figures show that the Litigation Division of NRA has secured favorable decisions in more than 90 per cent of the cases brought to trial. More than 700 cases have been docketed by the Litigation Division. Of 129 court actions to November 1 the decisions in all but ten have upheld the government's case. Until the court stage is reached NRA procedure provides opportunity for adjustment and settlement. The time element in going through the procedure has lately been greatly reduced by NRA, with consequent speeding up of presentation of cases and court action.

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House of Magic in New York

After two seasons of continuous performance at the Century of Progress Exposition, the House of Magic demonstration, which entertained so many thousands in Chicago, has been established in New York. A small auditorium has been prepared in the General Electric Building. Daily demonstrations will be given of the four machines, stroboscope, thyratron, cathode-ray oscillograph, sodium-vapor lamp, and other products of the General Electric Laboratory in Schenectady.

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Dividends Resumed

A dividend of 50 cents on the common stock of the Ohio Brass Company was declared last week, payable on December 15 to holders of record November 24. This is the first dividend on those shares since January, 1932, when they were on a $2 annual basis.

Directors of the Electric Storage Battery Company have declared for this year final dividends of 75 cents on the common and the cumulative participating preferred stocks, both payable on January 1 to holders of record of December 10. Quarterly dividends of 50 cents on the issues have been paid, and with this dividend the total for the twelve months will be $2.25. In 1933 a total of $2 was paid.

Directors of Kelvinator Corporation have declared an extra dividend of 20 cents per share out of net earnings of the fiscal year ended September 30, in addition to the regular quarterly dividend of 12½ cents per share, both payable January 2 to stockholders of record at the close of business December 5.

Wagner Electric Corporation last week declared a dividend of 50 cents on the common stock, payable December 20 to stock of record of December 1. The last previous payment was 12½ cents on September 1, 1932.

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Best October Output Since 1930

Larger October output of public utility plants than in any other year since 1930 and the largest for any month since March, 1931, is reported by the U. S. Geological Survey. The total was 7,815,000,000 kw.-hr.; 2,691,000,000 kw.-hr., or 34 per cent, was hydro-electric. The rise restores the lead of 1934 over 1933, which rose as high as 15 per cent in March and April, but was interrupted in August and September. Average daily production increased 4.5 per cent, or twice the normal amount, compared with September, while average daily production from water power was 11 per cent more than in September and 2 per cent more than in October a year ago. The rise in energy from this latter source marks the first upward turn since the beginning of the widespread drought last spring.

The Geological Survey figures are based on the operation of all power plants producing 10,000 kw.-hr. or more per month, engaged in generating electricity for public use, including central stations—both commercial and municipal—plants for electric traction and others.

Regional percentages over like months of 1933 were as follows:

Division	Aug.	Sept.	Oct.
New England	— 6	— 9	—2
Middle Atlantic	0	+ 1	+5
East No. Central	+ 2	+ 1	+6
West No. Central	+ 6	— 1	+5
South Atlantic	— 7	—14	+5
East So. Central	— 6	—10	+9
West So. Central	+12	+ 1	+4
Mountain	—13	—13	+1
Pacific	+ 4	+ 6	+5
United States	0	— 2	+5

New York Metal Prices

	Nov. 21, 1934 Cents per Pound	Dec. 5, 1934 Cents per Pound
Copper, electrolytic	9.00*	9.00*
Lead, Am. S. & R. Price	3.50	3.50
Antimony	13.12	13.75
Nickel ingot	35.00	35.00
Zinc, spot	4.025	4.05
Tin, Straits	51.25	50.87
Aluminum, 99 per cent	23.30	23.30

*Blue Eagle.

North American to Pay Cash Dividend on Common

In view of the decrease in the property additions requirements of its subsidiaries and of its own strong cash position, the North American Company has announced that the common stock dividend due next month will be paid entirely in cash rather than in cash and common stock as heretofore. At a meeting held November 26 the board of directors declared dividends of 75 cents per share on the preferred stock and 25 cents per share on the common stock for the quarter ended December 31, both dividends payable January 2 to stockholders of record December 5.

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New $10,000,000 Bond Issue

Public offering of a new issue of $10,000,000 bonds of the Northern States Power Company was made last week following approval by the Securities and Exchange Commission. The new refunding mortgage 5 per cent bonds, due November 1, 1964, were priced at 96, interest to yield about 5.26 per cent to maturity.

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50 Kilowatt-Hours for 10 Offered at Hartford

With the objective of reaching an average rate of 3 cents per kw.-hr. as soon as may be for domestic service instead of the present 4½-cent average, the Hartford Electric Light Company has established a plan for one year beginning December 1, 1934, under which 25 kw.-hr. of increased use will be given free to residential customers for each 5 kw.-hr. of increased use purchased up to a limit of 50 free kw.-hr. per month for each customer. After the expiration of the free period a new and materially lower electric home rate will immediately become effective for the benefit of those customers who wish to continue the use of materially more energy in their homes. Under that rate a customer may obtain substantially more energy for the same amount of payment than can be had under the present schedule. Equivalent "free energy" is available to all classes of users.

Reductions will be made annually in the general domestic schedule, until, when the average use in the community reaches 100 kw.-hr. a month, the electric home rate will be available to all, regardless of individual usage. In computing the bills under the new plan the usage in the corresponding month of the previous year or in October, 1934, will be the general basis for determining the free energy. Since 1921 the Hartford company has made four rate reductions, viz., 21, 15, 18 and 22 per cent. About 60,000 domestic customers are affected on the Hartford system and the offer represents more than a million dollars' worth of free service. Customers of the affiliated power companies at Stamford, New London, Manchester and Unionville will also participate in this so-called "share-the-benefits" plan.

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Bond Extension Sought

Proposal to the holders of the $6,470,000 outstanding first mortgage 5 per cent gold bonds of the Great Northern Power Company to extend maturity from Feb. 1, 1935, to Feb. 1, 1950, has been made by the company in a letter signed by M. L. Hibbard, president. A total of $10,000,000 of the bonds has been issued under the mortgage, of which $3,530,000 principal amount are now held in the sinking fund, and on December 1 there will be payable into the sinking fund $106,000 which will be available for acquisition of bonds for the fund. Holders to participate in the extension must present their bonds on or before January 31 unless directors of the company extend the time.

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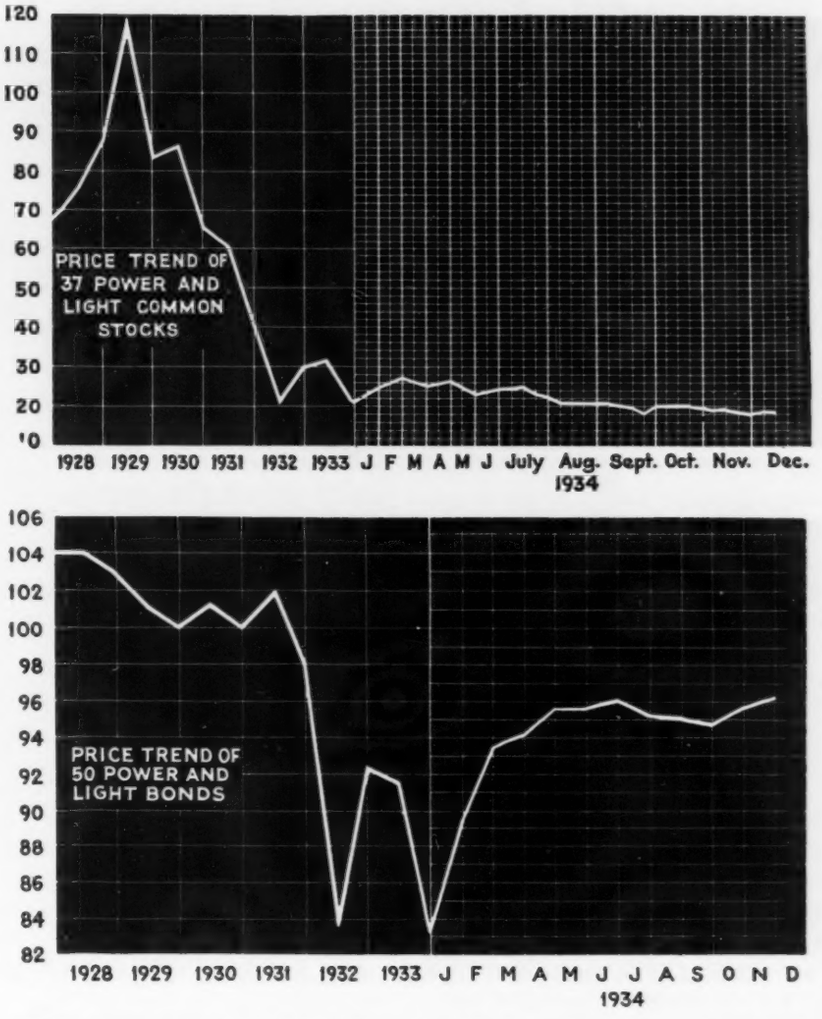
Associated Gas Plea Barred

Federal Judge Julian W. Mack has denied a motion made by the Associated Gas & Electric Company to reargue its move for the dismissal of a reorganization petition on the ground that it had not been filed in good faith. "After careful consideration of the memorandum presented by the alleged debtor in support of its motion and of the pertinent parts of the record," he said: "I adhere to the view that both the original petition and the intervening petition were severally filed in 'good faith.'"

Announcement has been made of the formation of a committee for independent representation of security holders of the Associated Gas & Electric Company and subsidiaries.

Utility Bonds Strong; Stocks Recover



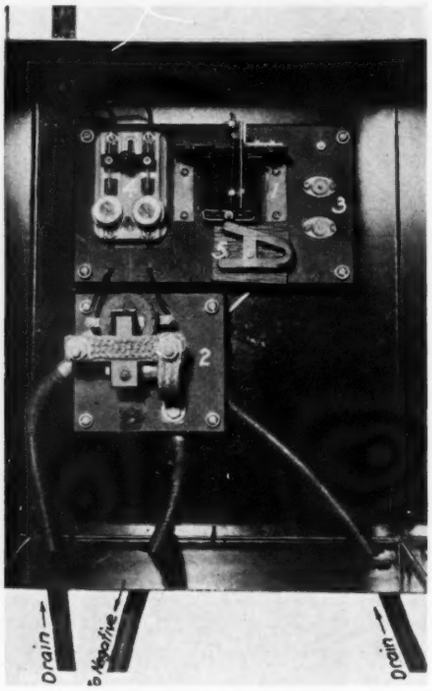
Utility bonds were firm during November and in some instances made new highs. "Electrical World" index 96.3; October 95.9. Stock prices have rebounded moderately from the decline resulting from new threats to rate structures. "Electrical World" index, 19.2; mid-November 17.8.

Structures Protected From Stray Currents

In draining stray electric railway currents from underground pipes and cables to the rail or negative return near the substation difficulty is frequently encountered. During some parts of the daily cycle the current may reverse and flow onto the underground structures over the drainage connection usually when one or more substations of a group feeding a network shuts down during off-peak hours.

To overcome this condition the Pacific Gas & Electric Company found it necessary to design and install in the drain an automatic switch which would remain open during periods when the rail, or negative, potential is higher than that of the structures at the point of drainage, and would close when the flow of current is from the pipe.

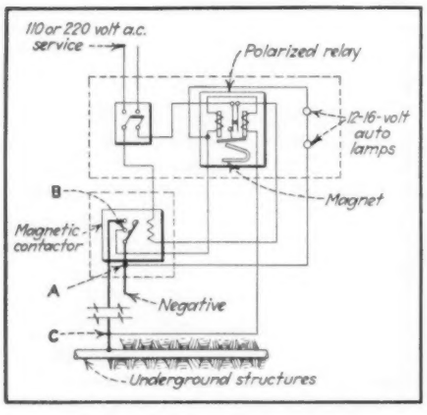
The major elements of the switch which performs these functions satisfactorily consist of an assembly of commercially available parts, including a polarized relay and a magnetic switch, items 1 and 2 on the accompanying illustration. The polarized relay (1), which controls the contactor (2) operates on 0.015 volts across the coils, a magnet (5) being added to provide additional sensitivity.



Drainage switch protects structures and cables from reversal of polarity of stray ground currents

In addition to its sensitivity this switch has the advantage of being very low in resistance, thus maintaining the potential of the structures very close to the potential of the negative return.

Stray current drainage switch opens on polarity reversal



In operation the relay is actuated by the drop in potential across the cable from point *C* to point *A* when the switch is open and to point *B* when closed. A current reversal of 5 amp. is sufficient to actuate the relay and allow the contactor to open. Resistance, built up as the lamp filaments are heated, keeps the reverse current within safe values. The current at 25 volts is 0.5 amp.

The magnetic contactor is mounted on a separate panel from the relay to prevent its closing impact from jarring the relay.

Assume contactor open and drainage cable, connected with the positive terminal of the contactor, slightly positive to the negative return. When potential from *C* to *A* becomes from 0.2 to 0.5 volt, depending on size of lamps used as resistors, relay points close, completing coil circuit and closing contactor. The polarized relay is now operated by the drop of potential over the drain cable from *C* to *B*. As long as the structures drain to the negative the relay points are held closed. When a reversal takes place and the potential from *B* to *C* reaches a value of 0.015 volts (which occurs at a current value of 4 to 5 amp.) the polarized relay points open, which in turn opens the contactor. Since the resistance of the relay coils is only 0.14 ohm, it can be seen that a high reverse current would flow from *A* to *C* through the windings when the switch is open. To overcome this problem the lamps are automatically placed in series with the coils when the switch opens. With the potential contact at *B* there is a low resistance path between *B* and *C*, so that the polarized relay will open on a very small reverse current.

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How Industrials Can Avoid Troubles

Industrial users of purchased power may be surprised to find that a large portion of their power troubles can be traced back to their own instrument transformers, according to an analysis made in one large industrial center. Many of these transformers were installed before the recent trend to co-ordinate power-system insulation, and have therefore become one of the weakest links in the chain, at least so far as the user is concerned.

For example, the insulation and clearances of instrument transformers among industries in the city considered had originally been co-ordinated with a 2½-in. gap, equivalent to 60 to 65 kv. Yet the 15-kv. arresters attached to the service lines had a 3 to 4 protective ratio, permitting the imposition of 65 to 75 kv. on customers' high-voltage equipment during disturbances, which is too high for these instruments transformers to withstand. As a result the transformers are susceptible to flashover or burnout with loss of meter registration, loss of control, destruction of adjacent equipment, prolonged outage of service, etc. Inadequate instrument transformers may become and have been serious hazards to continuity of service.

The solution is for industrialists to co-ordinate the insulation and clearances of their equipment with that of the incoming power line. Instrument transformers should be among the first items to consider. In this task advice and counsel can be secured from the utility company. Arresters that will limit the imposition of excessive overvoltages during disturbances are a great help. Unfortunately, insufficient space is available in most indoor industrial substations for station-type

YOU NEED THE SAVING THAT G-E GLASSWARE WILL BRING

GENERAL ELECTRIC street-lighting glassware is strong. It is designed for strength as well as for its excellent appearance and light distribution. Its manufacturing process is carefully controlled to assure the proper thickness of glass throughout; the globes are carefully annealed to remove all strains—to withstand the sudden changes in temperature they will meet in service.

The packing of G-E glassware gives it the greatest possible protection from breakage during handling and storage. These special light-weight, strong cartons mean a real saving to you in reduced maintenance.

The rippled surface of G-E glassware gives a sparkling but diffused light that will please your customers. A rain will leave the globe with a clean rather than streaked appearance.

Specify General Electric glassware. It is made in several sizes of many designs, so that you may have for your installation the complete family of glassware which best fits your needs. General Electric, Schenectady, N. Y,

G-E street-lighting glassware is carefully manufactured from selected materials

Careful packing reduces your breakage cost in handling and transportation

500-121

GENERAL ELECTRIC

arresters. New substations should be designed with more space to accommodate such equipment as well as oil breakers that can rupture a short circuit backed by the system capacity available at the point of service. Too many industrial circuit breakers are wofully inadequate and are a potential source of service hazard, especially when connected to large sources of power.

If industrial plants have not sufficient space indoors, they have the opportunity, with all the new equipment available, to place all the main service equipment outdoors in cabinets or cubicles without so many space restrictions. Incidentally, the indoor space thereby released may be more valuable for productive purposes.

•

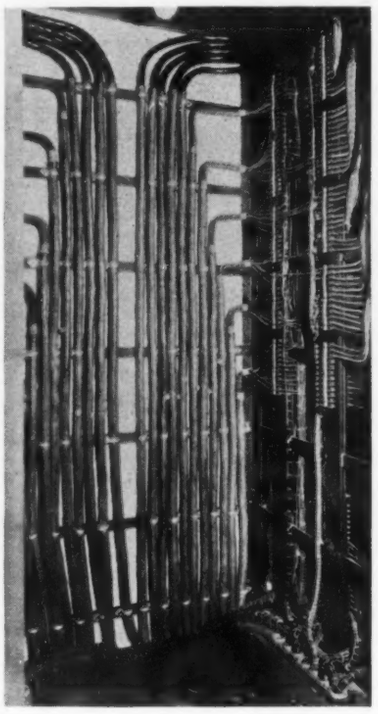
Limit Switch Used as Speed Indicator

In a California gold mine, a simple, effective and economical speed-indicator made from a limit switch and a standard lamp has proved very satisfactory. The thickening machines used for dewatering concentrates operate at extremely low speeds around 8 r.p.m. This is so slow that their movement is imperceptible without careful scrutiny so that it is possible for the machine to stop due to electrical or other trouble without it being noticed immediately by the operator. Subsequent starting is liable to damage the agitator arms as the liquid settles rapidly to the bottom of the tank and overloads the equipment. Hence the operator needs an easily read, reliable indicator to show that the machine runs continuously.

A track-type limit switch having a 1-in. roller on the end of its operating arm was attached to the frame of the machine so that the roller made contact with the teeth of the large ring gear that drives the agitator arms. A circuit was arranged so that the contacts of the switch operated a lamp located within the operator's field of vision. As the teeth of the ring gear pass underneath the roller of the limit switch the lamp circuit is made and broken so that, as long as the machine is running, the lamp flashes at the rate of about once each second. Several such indicators are now in use at this plant and have proved to be both practical and inexpensive.

Centralizes Testing of Control Wiring

Testing of all control circuits, current-transformer secondary and meter leads associated with the 115- and 69-kv. switchyards at the Cabot station of the Turners Falls (Mass.) Power & Electric Company is greatly facilitated by routing these wires through a terminal housing in a service building. A leaf was taken from telephone engineering practice in bringing each wire of each circuit to a separate terminal stud on an insulated block attached to a steel rack at either side of the illuminated terminal chamber.



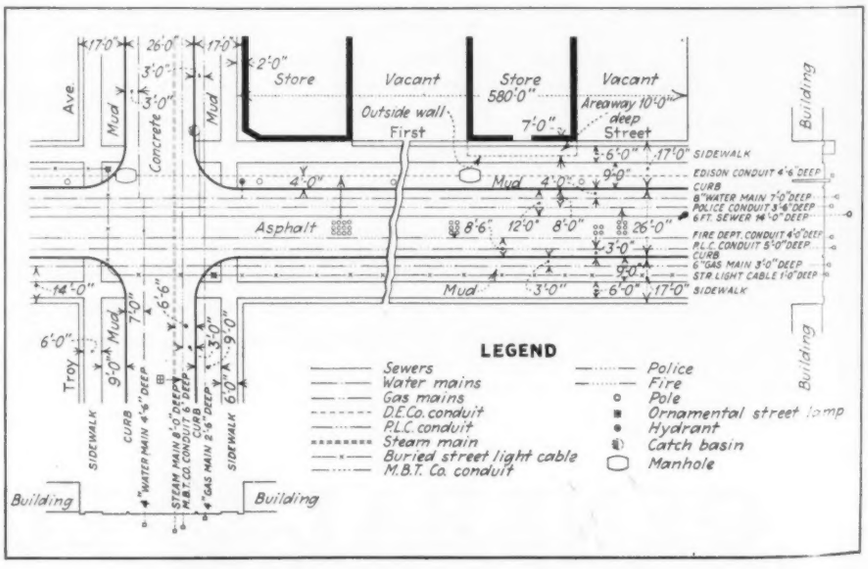
Control and instrument cables racked to facilitate rapid testing

Connections with the relay panels are made in conduit run from the top of the terminal housing to the board and back to the housing as required. From the terminal housing to the benchboard in the generating station low-current control circuits are run in No. 19 rubber- and lead-covered cable passing through the concrete parapet wall of the plant along the forebay. Symmetrical disposition of incoming and outgoing circuit cabling in the terminal housing on each side of the compartment relieves congestion and minimizes the spread of trouble in the event of local grounds, shorts or burnouts.

•

Survey Obstructions in Underground Work

When laying out an underground system or an extension to an existing one it is important to predetermine all possible subsurface obstructions. Any obstruction that may be overlooked in the design will cause extra expense and delay when discovered during the construction. In many cases it is utterly impossible to know of all obstructions until the ground is actually dug up, but an attempt should be made to anticipate them. A map of typical subsurface obstructions like the accompanying one by Detroit Edison Company should be a good reminder of what to look for.



Leaflets like this show street obstructions

With the New Oil-Circuit Recloser You Can

REDUCE LINE MAINTENANCE
IMPROVE SERVICE
GET BETTER PROTECTION

on outlying and low-capacity lines

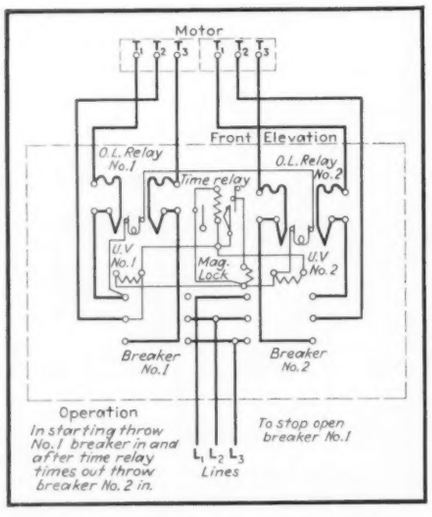
Here's Why: The oil circuit recloser provides all the advantages of larger automatic reclosing equipments for lines which produce small revenues. When a fault occurs, the recloser clears the line and then automatically recloses. After reclosure if the fault is cleared, it resets for another complete duty cycle. It will clear any number of momentary faults without attention and with minimum service outage. On sustained faults it locks out after a predetermined number of reclosures. It will reduce patrol work and confine service outages to the short-circuited line. ● Here is the answer to the problem of automatic fault protection for your outlying and low-capacity lines. For details, ask for Bulletin GEA-2003. Address the nearest G-E office, or General Electric, Dept. 6—-201, Schenectady, N. Y.

810-53

GENERAL ELECTRIC

Standard Control Adapted to Needs

For controlling a double-winding motor or two motors direct-connected to the same shaft a circuit used recently by a San Francisco industrial



Complete protection for 2-winding motor

plant is of general interest because its parts can be assembled quickly in case of emergency. Two 250-hp. vertical motors were mounted on the same shaft to drive a 500-hp. pump. As shown in the accompanying diagram the control equipment consisted of two manually operated oil circuit breakers, two undervoltage devices, two overload relays, one magnetic lock and one definite time relay.

In operation breaker No. 2 was locked out by the magnetic lock until breaker No. 1 had been closed approximately nine seconds—the time necessary to actuate the time-delay relay. The overload relays were wired in series so that overheating of either motor shut down the set through the undervoltage release coils. If the operator fails to complete the sequence of starting, the overload relay on No. 1 breaker stops the motor. The circuit gives complete protection to the motors, and the user reports that it is less expensive than the usual control for two-winding motors and has the additional feature of being made up from equipment that is generally available.

•

Heated Hotbeds Gaining in Favor

By A. H. GREISSER*
Portland (Ore.) General Electric Company

Survey in November, 1933, revealed that 158 soil-heating installations were connected to the lines of the Portland General Electric Company in Oregon. Sizes of these installations ranged from 200-watt trays utilizing bare nichrome wire on insulating spools and 400-watt heating cable units to a commercial cable installation of 16 kw. connected load. The total connected load in the 158 installations was 104.4 kw., with an estimated annual revenue therefrom of $3,132.

Heating of hotbeds is commonly accomplished by the use of lead-covered, asbestos-insulated, No. 19 nichrome (or similar alloy) wire in 60-ft. sections on 110-120 volts or 120 ft. on 220-240 volts. A 60-ft. length on 115 volts normally draws 400 watts and is used in a single sash (18 sq.ft.) or double-sash (36 sq.ft.) hotbed. Special thermostats for heat control of the hotbed are available at prices ranging from $5 to $11. The thermostat used most frequently costs $8.25, is rated at 25 amp. on either 115 or 230 volts a.c. and controls up to and including six 60-ft. circuits on 115 volts or six 120-ft. circuits on 230 volts. The temperature range of this particular thermostat is 40 to 110 deg. F. ± 3 deg. of its setting. This thermostat can be used on heating circuits of greater capacity than 25 amp. if a relay, priced at $6.50, is used. The energy used by electrically-heated hotbeds in Western Oregon varies from 1.0 kw.-hr. to about 4.8 kw.-hr. per day per sash (36 sq. ft.) and averages about 2 kw.-hr. per day per sash.

*From a paper, "Electric Heat for Plant Culture," presented before a meeting of the Northwest Electric Light and Power Association.

One of the largest electrically heated hotbeds in the Pacific Northwest is operated near Newberg, Ore. This commercial unit consists of four specially designed hotbeds, each 6x80-ft. in size, with a total connected load of 16 kw. The beds are used principally for tomato culture, so the temperature within the beds ranges between 65 and 70 deg. F. Following is a record of the energy used in heating the beds for one season:

	Kw.-Hr.
April 4, 1933, to April 14	905
April 14, 1933, to May 12	2,026
May 12, 1933, to May 31	2,227
Total	5,158

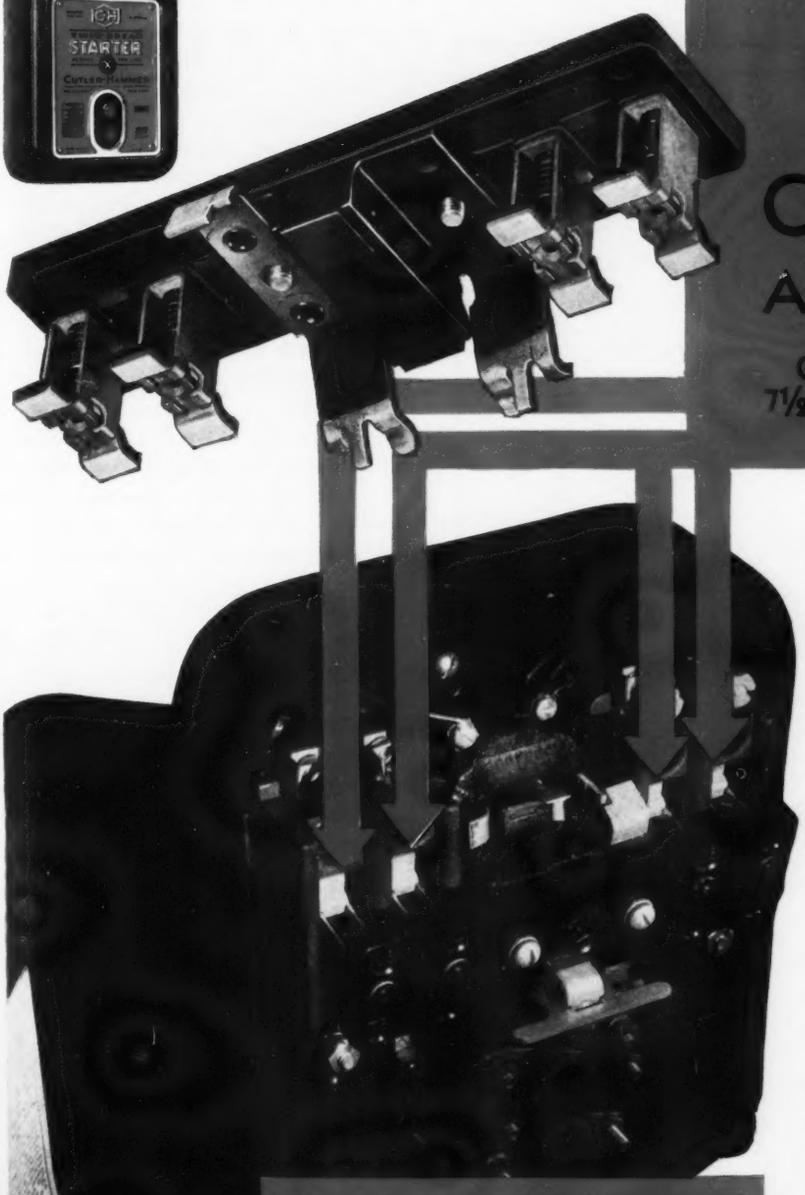
•

Probe-Lamp Reveals Barrel Interiors

To facilitate inspection of the interiors of wine barrels, Enrico Prati, superintendent of the Italian Swiss Colony in San Francisco, Calif., developed a special exploring unit of 25 watts rating, consisting of a $5\frac{1}{4}$x$1\frac{3}{16}$-in.

Fireproof inspection of barrels achieved electrically

tubular lamp mounted in a wooden holder $26\frac{1}{2}$ in. long with a candelabra adapter. The lamp and holder weigh only $2\frac{1}{2}$ lb. and service is supplied through a No. 18 rubber-covered portable cord.



How MILLIONS of OPERATIONS ARE BUILT-IN

C-H 9586 "AAA" Starters for 7½ h.p., 440 volts—5 h.p., 220 volts —and smaller motors

IN most plants the total horsepower of motors up to 7½ h. p. exceeds that of larger motors. Here lies the greatest opportunity for gaining the benefits of Motor Control, the link between fallible humans and their machines. C-H "AAA" starters will fully realize that benefit in any plant.

COMPARE the "AAA", as C-H does in keeping it ahead! KNOW that here is value, in terms of millions of operations!

Note that C-H uses contacts "shod," not plated, with solid silver. Unlike other metals, silver whether bright or oxidized is a perfect conductor—no oxide here that will "freeze" contacts together. In the "AAA", contact troubles are not STOPPED because *they do not* START.

Note that these contacts are twin-break, cutting heat rise, and snuffing out the remaining tiny arc in deep Thermoplax pockets. Note the simple "AAA" switching mechanism. It is designed with the same basic magnet structure as C-H heavy duty steel mill controls. It is so built because so far nothing more sure and certain has been developed. Not in laboratories but in daily, monthly, yearly operation C-H "AAA" starters prove C-H Motor Control Leadership with millions of operations.

Read the features opposite, an exclusive "AAA" combination. They tell why so many plants will buy no others, and why you should. CUTLER-HAMMER, Inc., *Pioneer Manufacturers of Electric Control Apparatus,* 1285 St. Paul Ave., Milwaukee, Wis.

These Proven Features Recommend Exclusive Use of C-H 9586 "AAA" Starters

1. Heavy silver twin-break contacts render oxidation harmless. Operate on severest inching service at maximum h. p. Carry rated current with less than half permissible temperature rise.

2. Deep non-removable Thermoplax contact-pockets "soak-up" arc. No shields to misplace, no fragile parts. Contacts easily renewed. Coils are readily changed. Only needed tool is screwdriver.

3. Twin-break contacts halve arc voltage.

4. C-H Overload Relay provides absolute protection . . maximum production. Changes for current-rating and type of motor made simply by changing heater coil.

5. Designed to prevent contacts closing due to jarring, etc., until starter-button is pushed.

6. 60 fewer parts. No pigtails to break. Loosening one screw dismounts entire control-panel. All parts easily accessible and demountable.

7. Convenient wiring channel between case and control panel. All leads brought in top or bottom.

8. Minimum of current-carrying joints. Low contact resistance. Low voltage drop.

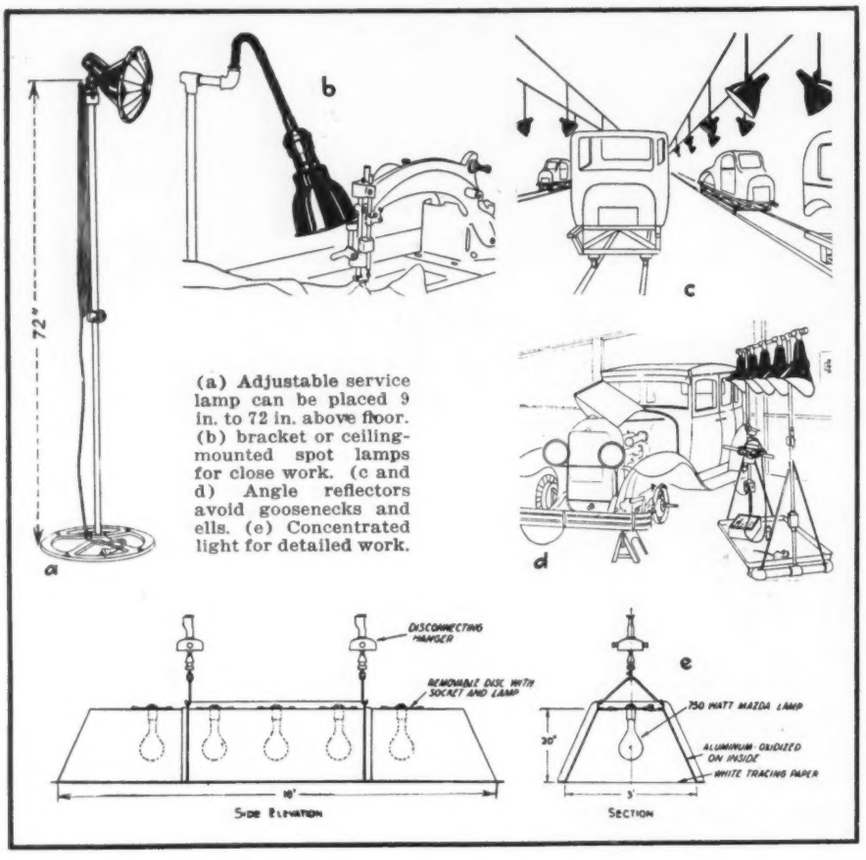
9. Stocked by responsible independent electrical wholesalers everywhere.

CUTLER HAMMER C-H MOTOR CONTROL

Starts, Stops, Regulates, Protects Industry's Motors

(B-255)

Intensified Light for Meticulous Work



(a) Adjustable service lamp can be placed 9 in. to 72 in. above floor. (b) bracket or ceiling-mounted spot lamps for close work. (c and d) Angle reflectors avoid goosenecks and ells. (e) Concentrated light for detailed work.

Material Handling Methods That Pay

Continuous and efficient movement of products toward their ultimate destination is essential to profitable business. While they stand still or go through circuitous routes, fixed charges on investments in equipment and operating expenses pile up without contributing to profit. These are two basic principles in all business, expressed by two men—Harry E. Stocker, Newtex Steamship Company, and Col. P. L. Gerhardt, industrial consultant for the Port of New York Authority—at a meeting of industrialists in New York, November 13.

From an electrical viewpoint these enunciations are equally important, because both men employ motor-operated, material-handling systems in applying these principles to their own problems.

Mr. Stocker, who has analyzed material handling for seventeen years, made the following comments: Antiquated terminal-freight handling is a costly expense because it increases the profitless holding of transportation equipment at terminals when its main purpose is to move goods. Modernized handling equipment which is applicable to the greatest variety of work and which can handle the freight in large blocks is essential to overcoming the prevalent inefficient methods. Among equipment which has found economical application are: Electric tractors with automatic-coupling trailers, portable electric lift and tiering machines, portable elevators, motor-driven belt and screw conveyors, electric cranes. Pallets and skids are essential adjuncts to these devices as they permit transferring large loads from one conveyance to another with least delay.

Cases were cited where modernization of material handling saved $500,000 a year, increased the transfer speed from twelve- to sixty-fold, reduced stevedore costs and product damage, minimized the number of ships needed, enabled unloading raw sugar from ships' holds at rate of 200 tons per hour, etc.

Several long-proven principles are widely overlooked, possibly because of the general way in which they must be stated, commented Mr. Stocker: "Economy does not consist merely of cutting expenditures but in spending money profitably. Those who are not spending money for modern material-handling equipment are nevertheless spending it on accidents and delays. Delays in effecting improvements are due to an attitude of finality and not studying other companies' practices. Organization inertia is retarding the adoption of new ideas. Those that are surviving the depression are those that seek and apply the best methods." Material handling is usually an important enough problem, he says, to demand major attention and should not be considered a secondary task.

Colonel Gerhardt expressed agreement with the principles enunciated and amplified one which he considers is overlooked by equipment sellers and users. It is the "necessity of installing material-handling equipment which will be adaptable to a greater variety of work, so it can be kept in use at least 75 per cent of the time. Otherwise the carrying charges during idle periods will offset the economies possible. Electric elevators accommodating up to 40,000-lb. loads, moving fifteen floors in 30 seconds, and electric tractors handling as many as thirteen trailers with automatic couplers constitute the major handling equipment at the new Port of New York terminal.

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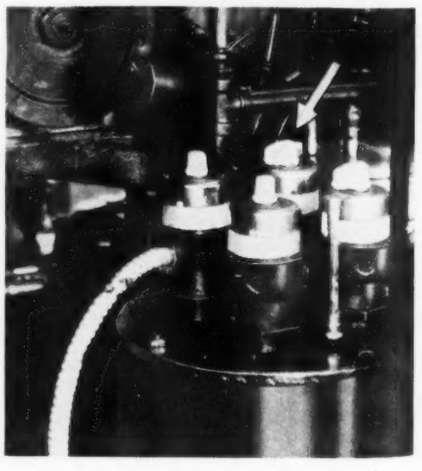
Aids Fluid Heating



Four heavy-duty immersion heaters have successfully licked a job of preheating lubricating oils from 60 to 130 deg. F., so that the oils may be circulated at the rate of 60 gal. per hour. Operating twelve hours a day, this installation is proving itself safe, fumeless, closely controllable.

WORK—IS A SOURCE OF PROFIT IN MANY PLANTS . . .

He will agree with you that Unit Drive with small high-cost motors is necessary for many machines and departments regardless of higher investment, maintenance and power costs. But he will point out that, where conditions permit grouping of machines with each *grouped production unit* powered by a larger, more efficient motor, Modern Group Drive not only offers definite advantages but important savings in first cost, maintenance cost and power costs. Although case studies prove this, he will ask for an opportunity to study your production requirements before submitting a planned recommendation.

Do not wait for this man to call—send for him. Ask us for a Roster of the Power Transmission Club membership. In the meantime, why not get a copy of the Red Book which is "a practical analysis of some fundamentals of Industrial Power Transmission." Write for it today.

POWER TRANSMISSION COUNCIL

(Sponsored by Mechanical Power Engineering Associates)

An association of producers and distributors of power, power units and mechanical equipment for the transmission of power.

370 LEXINGTON AVENUE, NEW YORK

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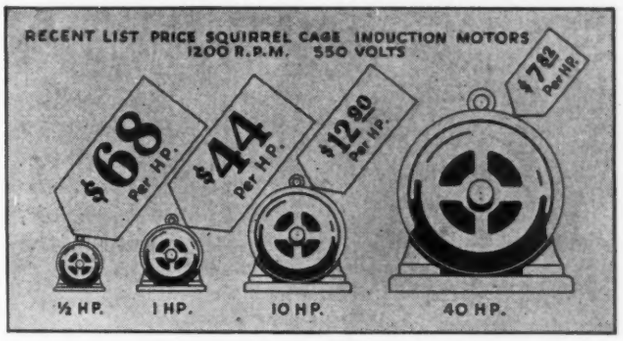
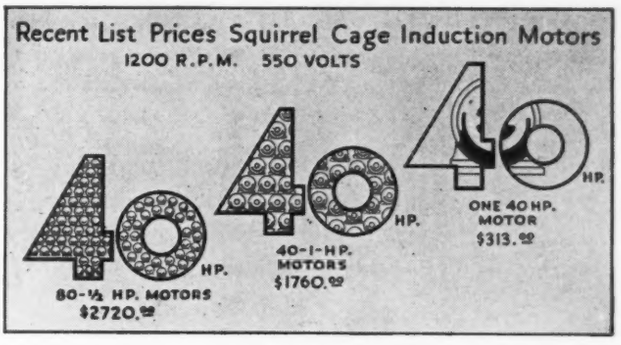
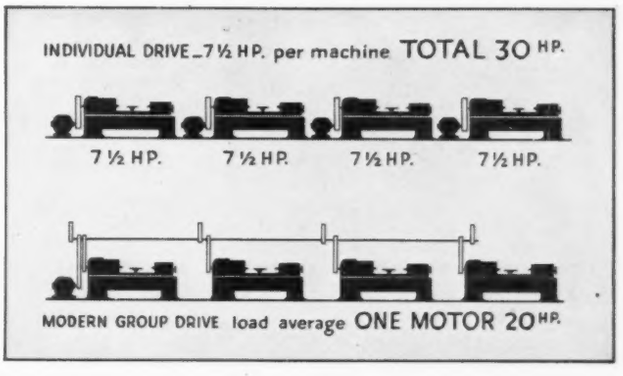
For example, consider the price of horsepower.



Then consider how the use of small motors affects your total horsepower investment.



Now see how much horsepower you actually need for a 20-horsepower job.



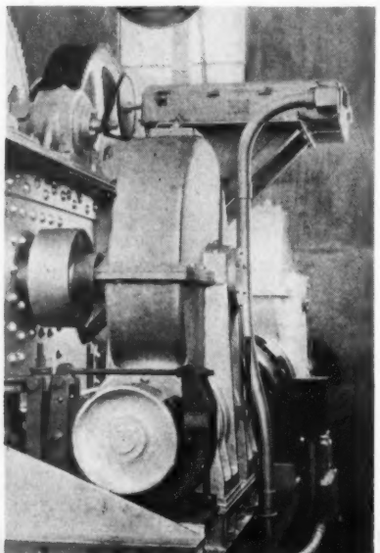
This advertisement (with this paragraph omitted) is appearing in Business Week, December 1st, Iron Age, December 6th, and the December issues of Power, Factory, Mill & Factory, Mill Supplies, Cotton and Textile World. It is published in Electrical World in order that the Electrical Industry may be currently informed as to our educational program. The group photograph in this advertisement is a scene from a sound-film demonstration of Modern Group Drive as an economic principle in power transmission. It is available, together with portable projection facilities, through any of our 54 Power Transmission Clubs.

A POWER DOLLAR SAVED IS A PROFIT DOLLAR EARNED

Motored Roller Gates at Dam on Kanawha

Among the first installations here of roller gates, successfully used abroad, are two identical ones at London and Marmet, W. Va., on the Kanawha River. This is exclusively a navigation project and the influencing conditions were the comparative unimportance of lockless navigation and the operating advantages of this type of gate. One reason for adopting roller gates was the fact that the sill had to be within 6 ft. of the river bed to obtain sufficient flood discharge capacity. This prevented the use of sector gates, which would have required an excavation which would fill up with sediment.

The roller gate is a hollow cylinder 20 ft. in diameter and 108 ft. long. There is a sprocket at each end of each drum engaging an inclined rack set in the pier. The rollers are raised by motors at the top of the pier operating a double-link chain passing around the drum at one end. The motor raises the gate 43.4 ft. at the rate of 9 in. per minute. Emergency power is from a 125-kw., 480-volt gasoline-electric set. The mitering gates for the locks are hydraulically operated, the oil pumps being driven by high-torque, low-current Westinghouse squirrel-cage motors. The job was supervised by the U. S. Army engineers and the Dravo Contracting Company of Pittsburgh was the general contractor.



Raising motors housed at top of pier

This motor with speed reducer is so arranged as to clutch with the small diameter gate or its flap in the raising or lowering operation. Full-magnetic, reversing, inductive time-limit control is co-ordinated with traveling-nut limit switches for extremes of gate and flap travel.

Westinghouse

Flow on Kanawha controlled by roller gates

Two rollers at left are raised slightly. Those at right are closed. One of the latter is of smaller diameter, but has hinged flap (here closed) which can be lowered at high water to let trash and ice pass over.

•

Metal Spray Proves Fine Repair Practice

By J. F. DAVENPORT
Superintendent Hydro Generator,
Southern California Edison Company

It was formerly the maintenance practice when seal rings, turbine runners, liner plates and other parts subjected to water wear were considerably worn to discard them as unfit for further service. During recent years we have developed a method of repairing these parts by means of both welding and the metal spray. The metal spray process is particularly interesting as it is a much more recent development than the welding process. It also has the advantage of placing metal on the worn part without distorting in any way the worn part, which would be the case if it were repaired by welding. It is also possible by the use of metal spray to place a hard-surfaced metal on a material such as bronze or other soft metal.

Considerable experimenting has been done in the last year or two in the use of the spray gun, and it is only recently that it has been possible to secure proper effective bonding between the parent and the sprayed metal and also secure a dense surface after the spraying has been completed. However, with the newly developed process and reliable spray guns all of these old objections to the sprayed metal surfaces have been overcome. The result is that it will be possible to save thousands of dollars in maintenance costs and the life of the wearing parts will be prolonged for many years, particularly when high carbon steel is sprayed on softer surfaces, such as bronze. In this latter case the life of the repaired parts will be much longer than that of the original parts due to the slower wearing away of the harder metal.

It can be foreseen that if the wearing

LOAD BUILDING

need not be a slow process

THE ABC of all merchandising is C-O-N-T-A-C-T. And, intelligently done, load building is a merchandising operation, pure and simple. The more effective the contact, the quicker the results in substantial profits.

Radio has demonstrated its amazing power in building the domestic load *quickly* for utilities. It affords the widest personal home contact possible in securing the ears of homeowners for news of refrigerating, water heating, cooking, cleaning, and air-conditioning—by Electricity!

Local NBC stations will take your interesting stories about the Electrical Way of Doing Things right into the homes of more customers and prospects than you could reach in any other way. Their welcome is assured, for they come arm-in-arm with NBC entertainment prepared by NBC Program Experts. 'Phone your local NBC station for the new, modern way to build your domestic load—*quickly!*

NATIONAL BROADCASTING COMPANY, Inc.

NEW YORK ★ WASHINGTON ★ CHICAGO ★ SAN FRANCISCO
WEAF & WJZ WRC & WMAL WMAQ & WENR KPO, KGO & KYA

SALES REPRESENTATIVES AT: BOSTON—WBZ • SPRINGFIELD, MASS.—WBZA • SCHENECTADY—WGY
PITTSBURGH—KDKA • CLEVELAND—WTAM • DENVER—KOA • PORTLAND, ORE.—KEX
SPOKANE—KGA • SEATTLE—KJR

A RADIO CORPORATION OF AMERICA SUBSIDIARY

parts are worth this maintenance expense it would be possible, aside from the crystallizing of the material, to keep the original wearing parts, including turbine runners and waterwheel buckets, in operating service for many years by the proper use of the metal spray process.

•

Dutch Sodium Lamps at Practical Stage

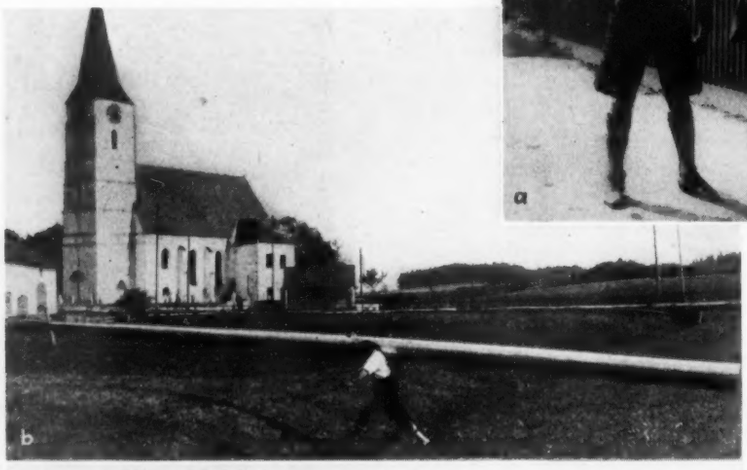
Development of sodium lamps for street lighting has reached a stage in Holland that makes these lamps available for commercial use, according to the Electric Equipment Division of the Department of Commerce,, quoting from the annual report of the N. V. Philips Glow Lamp Works. It is stated that construction has been improved and simplified and the period of life increased. Trial installations of lamps in the experimental stage were reported some time ago.

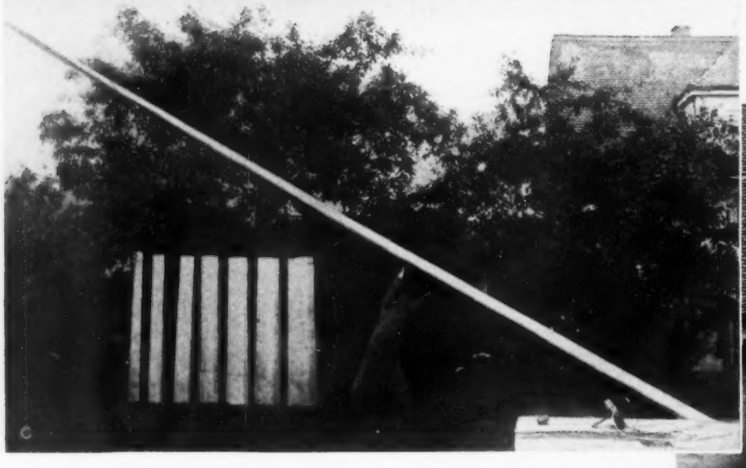
Announcement is made also of a mercury-vapor lamp, said to give a dead white light, made by the same company and believed to be even better than the sodium type for the illumination of traffic arteries.

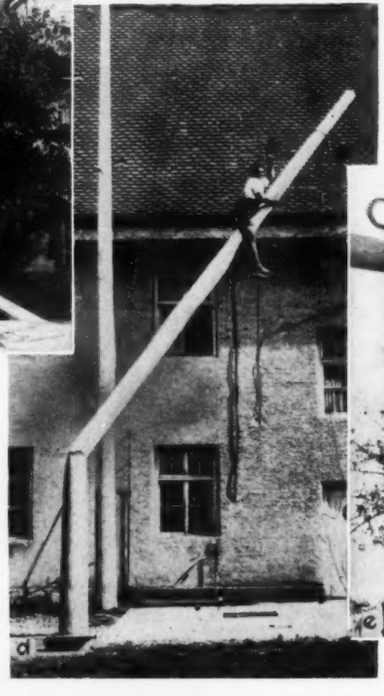
Britain Tests Sheet-Steel Pole

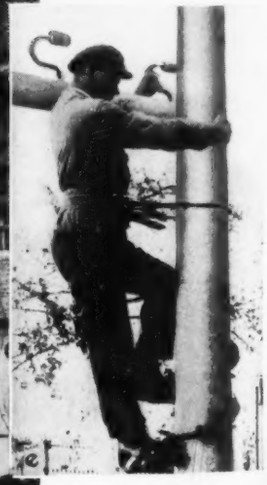
Several districts in Germany and Italy have installations of a new sheet-steel pole invented by J. Pfisterhammer, a young Munich engineer. These involve the German State Railway and Bavarian power company for low-voltage service; transmission lines are being erected in the Italian Alps and in Jugoslavia and Greece. The Forest Products Laboratory has made tests of these poles in the presence of British Post Office, Gentral Electricity Board, Rhodesian and other engineers to disclose their strength. On the beam machine one pole designed with a factor of safety of 2½ to fail at 8,000 lb. (applied 5 ft. from the lower end) reached 9,500 lb. It was 1½ millimeter steel of 60 to 70 kg. per square millimeter tensile strength. A pole of 2 millimeter sheets failed at 19,000 lb.

Twelve standardized tubes make all pole sizes likely to be required. They are fabricated by welding the longitudinal seam after the conical cylinders have been rolled. Next they are pressed into oval cross-section, pickled and galvanized. According to British estimate the equipment to produce 1,000 poles per month would cost £1,500. For low-tension lines sections III to VII would give a height of 30 ft., weigh 200 lb., have a normal loading of 575 lb. and a ground line reaction of 9,226 lb. Sections V to XI give a 38-ft. height for higher voltage lines, weigh 488 lb., normal load 1,060 lb. with 19,222 lb. of ground line reaction.









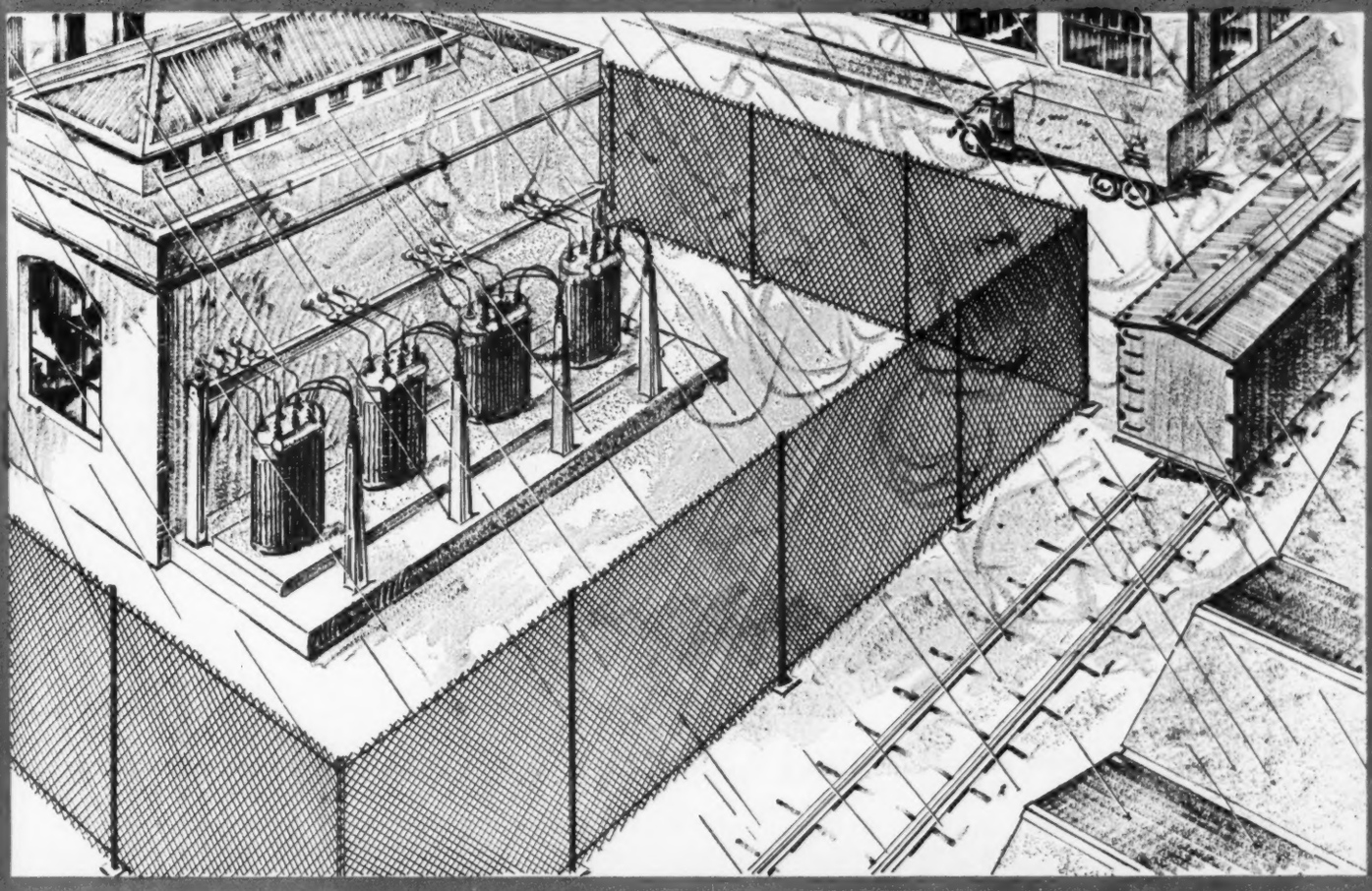
(a) **Bavarian line gang** goes out to set a pole.

(b) **One-man crew carries tubular pole cross lots**—Sheet-steel pole is one-third to one-quarter of the weight of equivalent wood pole.

(c) **Thirty-foot pole set by one man**—Each section is two meters (6½ ft.) long and tapered to stack with overlap to depth equal to major elliptical diameter. In storage and transportation they stack inside one another. The butt end may be concreted, bituminous coated or dipped in hot lead bath for added protection of the galvanizing.

(d) **Salvage high, only buckled section replaced**—Elliptical section placed with major diameter at right angles to line. Even distribution of stresses claimed with high elastic and torsional limits. Life expectancy claimed to be double that of wood pole.

(e) **Climbing irons hook about pole** — Crossarms slip over or clip on to the mast head without weakening the pole or forming pockets for collection of precipitation.



Corrosive Atmospheres hold no terrors for *BETHANIZED WIRE*

By specifying that chain-link fence or strand be made of Bethanized Wire, ample protection can be secured against sulphur, soot or other corroding agents in the air.

Bethanizing is a new process for coating wire with zinc. It makes possible a zinc coating from two to three times as heavy as can be put on by ordinary galvanizing. Thus, on a basis of relative weight of coatings, fence or strand made of Bethanized Wire can be given more than double the life of that made in other ways. In addition, the Bethanized coating is more uniform, more flexible than other coatings. This means there are no thin spots to give out soon, no cracks from handling to open the door to rust.

In appearance, too, fence made of Bethanized Wire sets new standards, with a silvery lustre that lasts a long time.

For real protection to an investment in fence or strand specify Bethanized Wire, 1.6 or 2.4 oz.-per-sq.-ft. coating. Fence with the 1.6-oz. coating will last at least twice and with the 2.4-oz. coating at least three times as long as special galvanized wire.

We will gladly send a folder describing Bethanized Wire in detail.

BETHLEHEM STEEL

BETHLEHEM STEEL COMPANY

BETHLEHEM, PENNSYLVANIA

BUILDING UP THE LOAD

APPLIANCES, LIGHTING AND POWER • DOMESTIC • COMMERCIAL • INDUSTRIAL

Clouded Calendar Tells the Story

By BENJAMIN FINK

Appalachian Electric Power Company, Bluefield, W. Va.

Winter brings heavy clouds, rain, fog and snow, dark, gloomy days, which require the use of electricity for lighting. Then comes a line of customers before the cashier's cage saying, "My electric light bill is too high this month." A few of these complaints may be due to the customer forgetting that fewer daylight hours require additional hours of lighting. These may be explained by the use of a chart graphically showing the decreasing amount of daylight during the winter months. But there are many dark days, quickly forgotten by the customer, which require the use of extra electricity for lighting during normal hours of sunlight. Even the most parsimonious consumer of kilowatt-hours will then automatically turn on the electric lights.

A clouded calendar marking dark days for use by the cashier when customers complain of high winter bills

If the cashier will prepare an ordinary wall size calendar by shading with dark crayon those days or parts of days which were dark, cloudy or rainy he can easily show the customer what caused this extra consumption. This shaded calendar record should be kept daily. It can be used by companies that maintain the regular calendar month as their billing period as well as those companies that operate on a continuous meter-reading basis.

By referring to the shaded calendar, which should be kept within easy reading distance of the customer, the cashier can show that, say, seven of the thirty days were dark days. In other words, 23 per cent of the billing period necessitated the use of lighting facilities which would not have been required had the weather been clear. This fact, tactfully brought to the customer's attention, serves to recall the days in question, and the explanation plus the shaded calendar record is usually considered satisfactory.

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New Bargain Rate Tied into Housing

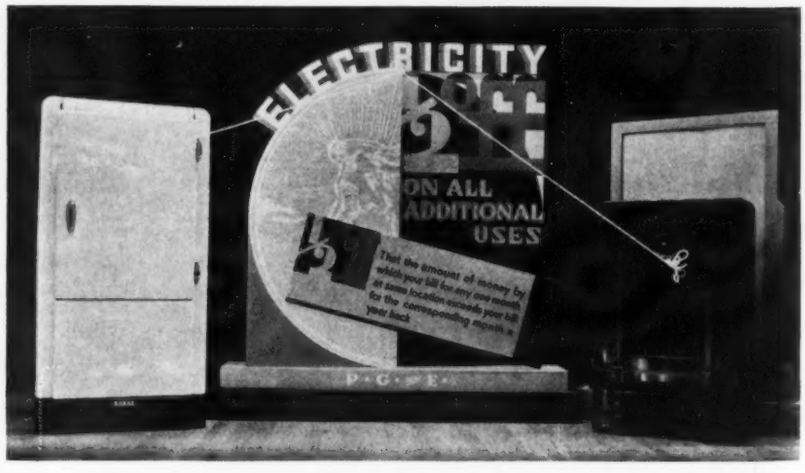
Pacific Gas & Electric Company is swinging its special bargain rate for domestic and commercial lighting service in behind the federal housing drive. The new rate will provide a 50 per cent reduction in the cost of all electricity used in any month after December 31, in excess of the amount used in the corresponding month of the preceding year. It now offers this cost reduction as a further factor in the present opportunity for home modernization, in which manufacturers are providing low-priced appliances, the banks offer low-cost money and the Federal Housing Administration is developing the general home-building program.

Vice-President R. E. Fisher believes that this rate bargain will increase the sale of household appliances and stimulate the use of lighting in merchandising. Industry meetings are being held to formulate co-operative selling plans.

•

Old Ranges Down Payment in Hub

The most vigorous campaign for selling electric ranges ever launched by the Boston Edison Company went into action on November 20, when every customer turning in an old range as his only down payment was given the opportunity to obtain a 9,100-watt electric range at a price of $69.50 with nineteen months to settle the account on a dollar-a-week basis. An allowance of $10 was made for each old range of whatever type and make turned in, and with but a few exceptions, due to location, installation and wiring will be provided free of charge. Free automobile transportation was made available from the customer's home to the nearest Edison shop. Electric cooking demonstrations were scheduled to take place at every one of the 31 retail stores of the company in its 700-square mile territory, and during the period of the campaign "Friendly Kitchen" radio broadcasts will be given from the Bos-



Window display now promoting new Pacific Gas & Electric bargain rate reduction

ton Edison station WEEI four mornings weekly. The Boston campaign is planned to tie into the federal housing program.

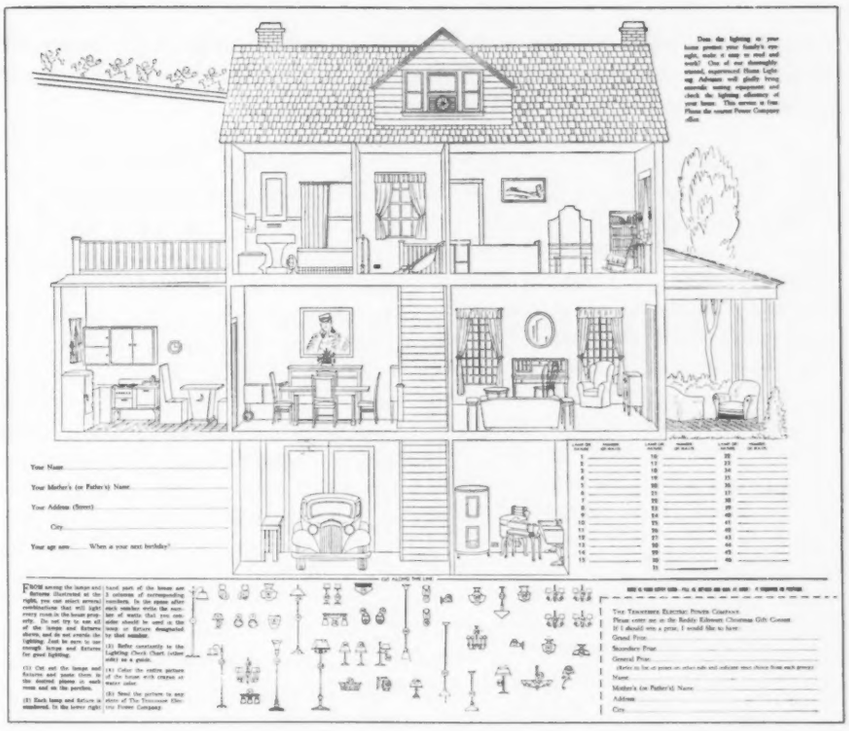
•

Electrified Farms Trebled in Northeast

"Striking gains in the use of electricity in farming in New England, New York, New Jersey and Pennsylvania have been achieved in the past decade. New Hampshire now leads the nation in the percentage of farms having electric service. In the nine northeastern states the number of electrified farms has increased from 45,740 to 168,051 and the percentage electrified from 9.48 to 34.83. In New Hampshire 61.49 per cent of the farms now have electric service. The average energy consumption per farm in the northeast is now 757 kw.-hr., Rhode Island leading with 914." These statements were made by Dr. E. A. White, director of the Committee on the Relation of Electricity to Agriculture, at the meeting of the American Society of Agricultural Engineers and the New England Rural Electrification Committee, recently held in Amherst, Mass.

Dr. White estimated that a total of 672,000 rural customers is now served electrically in these states and that potential markets for rural service point to a future use of from 3,800 to 4,500 kw.-hr. per farm. In May, 1934, New York State led in farm totals, 57,627 such establishments using 46,405,000 kw.-hr., or 813 kw.-hr. each. He pointed out that it is no longer necessary to move from country to town to enjoy the benefits of home modernization and predicted a vast increase in the use of refrigeration and other power applications in farming, "making man a director of power rather than a prime mover."

Christmas Contest for Children



Every household on the lines of the Tennessee Electric Power Company has been invited to participate in a Christmas gift contest for children. Each eligible child must cut out and paste up sufficient lighting fixtures properly to light the home according to the entrant's best knowledge. Each entrant must also specify the wattage to be used in each fixture pasted up. Finally, the drawings must be colored. Coloring, as well as solution of the lighting, is considered in judging. No "master" or "key" solution of the lighting problem has been prepared.

The prizes will be 176 domestic appliances, offered to the children as Christmas gifts for their mothers. A lighting expert will be among the three judges. From the contest prospects will be secured for better home lighting as well as for electrical appliances.

Ten Years of Rural Electric Development in Nine Northeastern States

State	Number Farms 1930	Farms with Elec. Serv., 1923	% Farms with Elec. Serv., 1923	Farms with Elec. Serv., May, 1934	% Farms with Elec. Serv., May, 1934	Kw.-Hr. Used by Farms 1933	Av. Kw.-Hr. per Farm 1933
Maine	39,006	5,676	11.3	13,645	34.98	7,228,000	547
New Hampshire	14,906	2,396	11.4	9,166	61.49	5,506,000	659
Vermont	24,898	2,384	8.6	7,974	32.02	6,286,000	802
Massachusetts	25,598	2,440	7.3	14,522	56.73	11,096,000	772
Connecticut	17,195	2,626	11.3	9,100	52.92	6,871,000	745
Rhode Island	3,322	400	10.2	1,985	59.75	1,815,000	914
New York	159,806	16,000	8.5	57,627	36.06	46,405,000	821
Pennsylvania	172,419	12,818	6.5	38,843	22.53	30,440,000	813
New Jersey	25,378	1,000	3.4	15,189	59.85	11,597,000	780
Totals	482,528	45,740	9.48	168,051	34.83	127,244,000	757

Putting a Note of Human Interest Into a Rate Presentation

To dramatize its "Full-Use Residential Electric Rates" the Middle West Utilities Company is using this graphic picture in its advertising. This rate is gradually going into use throughout the system, with only slight variation as to the number of kilowatt-hours embraced by the two top steps

Better School Lighting Pays

School authorities of Mt. Lebanon, Pa., report photo-cell controlled illumination of 12 ft.-candles increased student progress 28 per cent and stimulated alertness and responsiveness

By H. L. JOHNSTON
Director Lighting and Wiring Service
Duquesne Light Company

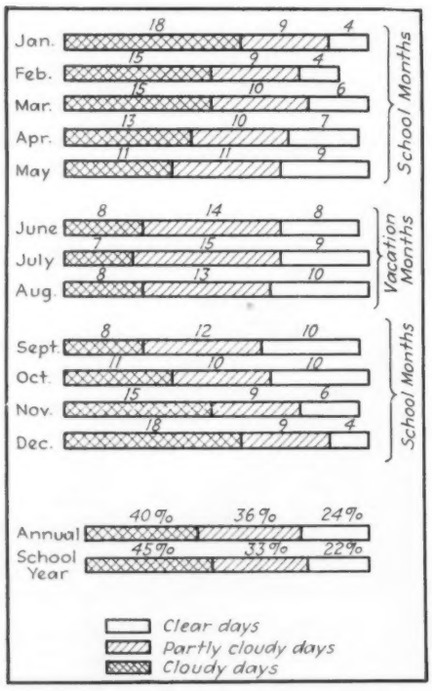
A NEW opportunity for relief to the overburdened taxpayer is presented in the results obtained on an experimental school-lighting installation in the past year. The school authorities find that pupils in a well-lighted room show 28 per cent improvement in class work over pupils in the regularly lighted room.

In other words, illumination will produce more effective results from our existing school systems, or those schools which have shortened their school year may still find it possible to complete a full year's work in the shorter period. The significance of this is apparent when we consider that approximately $400,000,000 has been spent annually for new schools.

Sunlight is such a variable item that during the school year only 22 per cent of the days are recorded as clear by the Weather Bureau in Pittsburgh. Therefore, it becomes necessary to provide artificial light to assure satisfactory visibility in the classroom. This is particularly true if the pupils occupying seats remote from the windows are to have an equal opportunity with the pupils adjacent to the windows. On a clear day the first three rows of desks nearest the windows are provided with 25 ft.-candles or more, while farther away the illumination drops rapidly. On a cloudy day the illumination does not reach this value on any desk.

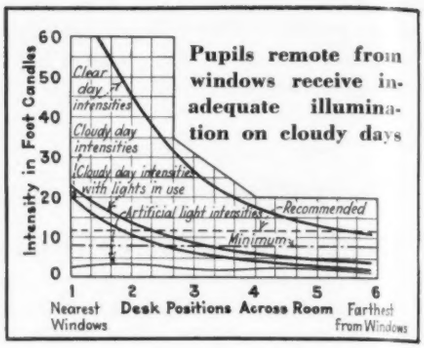
In order to obtain data on the relation of student achievement to classroom lighting an experiment was conducted in the Lincoln School, Mt. Lebanon, Pa. The school authorities co-operated fully, using a well-lighted room for comparison with a normally lighted room. Two third-grade classrooms were chosen having the same floor and window areas, blackboard space, paint and type of desks. The pupils were equally divided on the basis of their intelligence as determined by the Kuhlmann-Anderson intelligence test.

Room B was provided with four 500-watt totally indirect Pittsburgh "Luminaires," which provided a minimum of 12 ft.-candles on the working plane. Illumination in this room was controlled automatically by a Weston "Photronic cell" to connect the artificial lighting when the natural light dropped to 12 ft.-candles and disconnect it when a value of 14 ft.-candles was available. Room A was equipped with the usual four 100-watt inclosed-glass lighting units, giving values indicated.



Number of clear and cloudy days demanding supplementary interior light

Data furnished by U. S. Weather Bureau for Pittsburgh district, based on 25-year average. Figures over bars indicate days cloudy, partly cloudy and clear.



Pupils remote from windows receive inadequate illumination on cloudy days

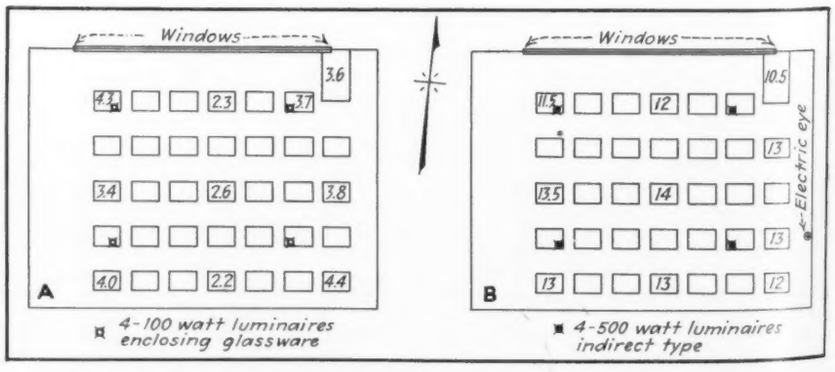
The pupils were paired on the basis of the intelligence test and the Pressy achievement test. The two teachers departmentalized their work so that each teacher taught each group the same amount of time. With all factors pertaining to the two groups equal except the artificial lighting, the experiment was started with the opening of the school in 1933.

The results at the end of the school year in 1934 are reported by the school authorities as follows:

1. The pupils in the properly illuminated room (B) showed approximately 28 per cent more improvement than the pupils in room (A). (Shown by the results of the Pressy and Metropolitan achievement tests, given at the close of the experiment.)
2. The pupils in this same room (B) were more alert and more responsive. There was no lack of enthusiasm just because a day was dark and dreary. The group in room (A) were indicative of the weather.
3. The teachers developed a similar attitude. They commented on several occasions that room (B) was a much more pleasant location in which to teach. (Both teachers were skeptical of the experiment at the beginning of the year.)

The results of this experiment supplement a previous experiment reported in the Illuminating Engineering Society *Transactions* of November, 1932.

The school presents an opportunity for further experimental lighting work in all of its grades. The new business possibilities are tremendous.



Two levels of schoolroom illumination compared by achievement tests

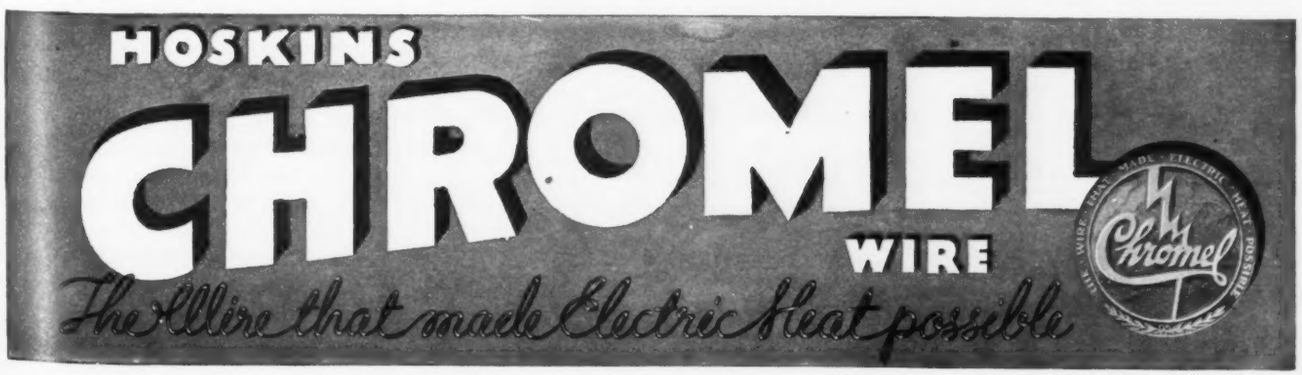
Illuminations produced on different desk positions without any exterior light are shown in foot-candles. Rooms were identical except for artificial lighting.

What made THE ELECTRIC RANGE *possible?*

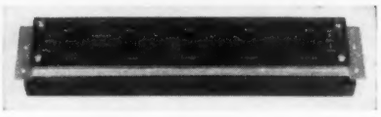
Back in 1906, it had been known for 150 years, that heat could be generated by passing electricity through a wire. But that knowledge was of little significance, because where the heat was of enough intensity to be of practical use, all known wires (except platinum) quickly "burned-out." . . . Consequently, there was no electric heating device industry, and electric heat was merely of scientific interest. . . . But in 1906, A. L. Marsh discovered the CHROMEL alloys of nickel-chromium, from which wire was made that proved to have more than 300 times the durability of any other wire then known. Out of this discovery, the present heating device industry came into being; and thus was created millions of dollars of annual revenue for the Electric Utility; and the art of cooking was given its greatest advance, by the new-born Electric Range. . . . All this happened 28 years ago. Since then, the discoveries of science have up-rooted many long established products. But nothing has ever replaced the nickel-chromium alloys of CHROMEL, which serves today as the heating-element for all electric range manufacturers. . . . Yet the Chromel of today is to the Chromel of 1906, as today's range is to the one first made. No flamboyant claims of quality need be shouted. The merits of Chromel are well proven in the priceless good-will and reputations entrusted to it, by the heating device industry. . . . All electric ranges are good ranges, made so by good companies, and sustained by CHROMEL.

For technical data, send for Catalog JW. If interested in designing heating-units, ask for our Heating-Unit Calculator, Form-KD.

HOSKINS MANUFACTURING COMPANY, DETROIT, MICHIGAN



Two NEW "DIAMOND H"
developments make the
ELECTRIC RANGE
easier to sell . . .
easier to use



APPROVED BY
UNDERWRITERS LABORATORIES

The NEW "DIAMOND H"
Silver-Break Toggle Range Switch Panel

Here is a range switch built on entirely new principles . . . just the way heavy duty switchgear is engineered for line service, with silver to silver contacts.

The "Diamond H" Silver-Break Toggle Two-heat Range Switch is simple, trouble-proof, positive in action . . . tested and endorsed by leading electrical engineers and testing laboratories . . . less wiring, less service, longer lived unit coils, simple range operation.

It assures the prime requisite of any load-building appliance . . . to give the customer lasting satisfaction and encourage full utilization. Already leading range manufacturers have incorporated this valuable new sales and service feature. Write us for full details and specifications. Make this better range switch part of your sales program.

The NEW "DIAMOND H"
"S 3" THERMOSTAT
for table top Ranges

Constructed for easy and quick mounting back of the switch panel, with operating knob conveniently located adjacent to the switch handle. It is possible to mount this thermostat in the back of the oven with remote control operating handle and dial on the back splasher. It has an accurate temperature indicating pointer and is so designed that it is not necessary for the actuating element to extend into the oven proper. It may be made in double pole if desired and is of special interest to range manufacturers desiring complete compact construction.

Another outstanding step forward in the utility and convenience of the electric range.

The Hart Manufacturing Company
Hartford, Connecticut

LETTERS TO THE EDITOR

Whistling in the Dark

To the Editor of ELECTRICAL WORLD:

It seems to me that both the editor of the ELECTRICAL WORLD and the engineers of electric utilities are whistling to keep up their courage. The editor says: "The public is ready to accept the home electrification idea." If by "home electrification" he means wide use of electricity for heating and cooking, then my answer is: Yes, at the taxpayers' but not at the home owners' expense. Where gas of not less than 520 B.t.u.'s per cubic foot is available at less than $1 per 1,000 cu.ft., the use of electricity for heating and cooking at reasonable rates to the utility is uneconomical. Simple calculation will show that it is no more expensive to use gas at $1 per 1,000 cu.ft. in a gas stove whose efficiency is 50 per cent than electricity at 1 cent a kilowatt-hour in a range whose efficiency is 80 per cent.

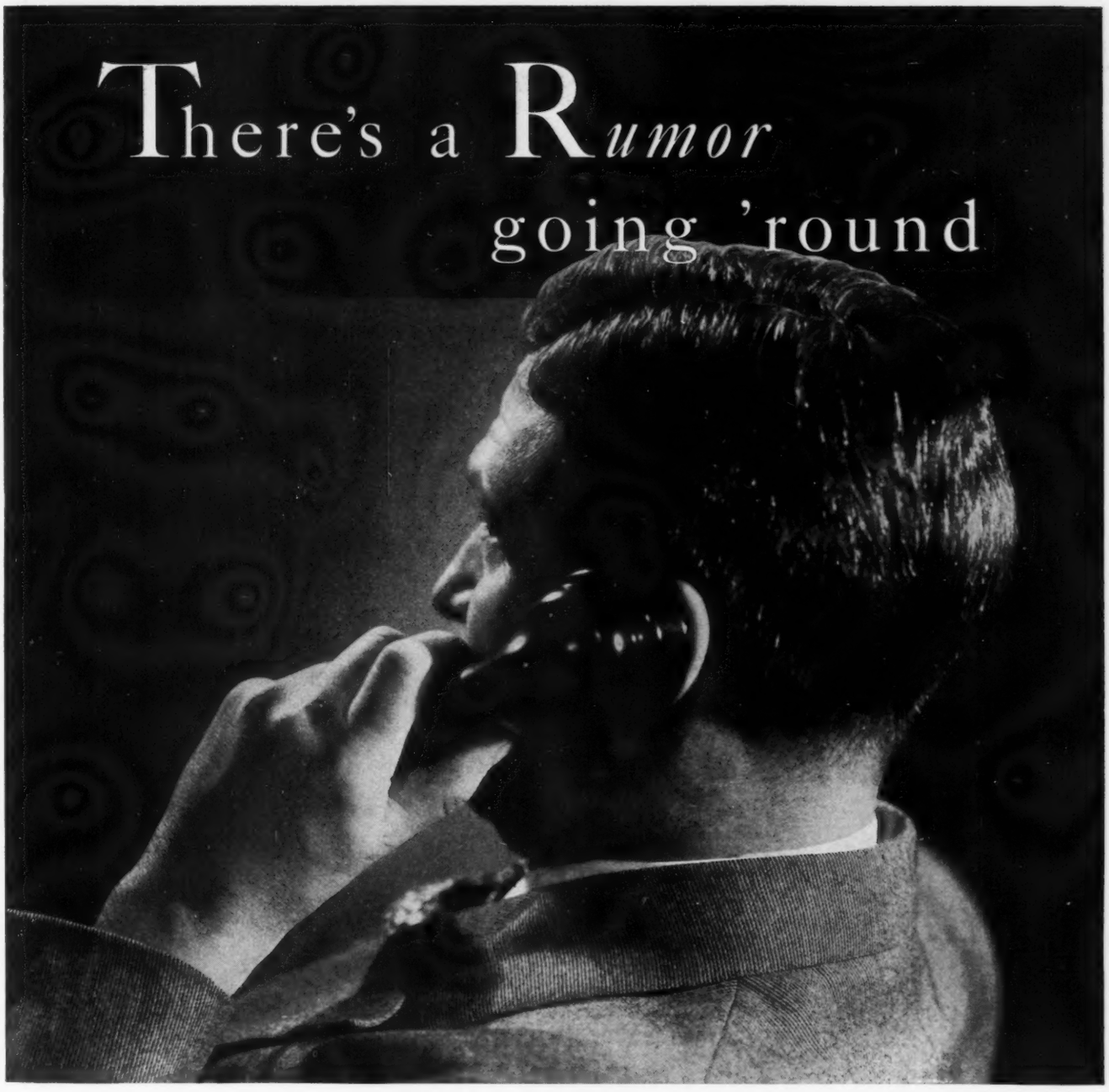
The modern, insulated gas range has a much higher efficiency than 50 per cent, and if the cost of ranges is considered, the advantage is wholly in favor of the gas range. But few, if any, private utilities can afford to sell electricity for as low as 1 cent a kilowatt-hour and pay the taxes demanded by the different governments.

That the electric range and water heater cannot compete with the gas range is disclosed by the data printed on page 35 of the November 10 issue of the ELECTRICAL WORLD. A modern gas range and water heater can be bought for less than one-half the expenditure per unit there given. The depreciation and interest on one-half the cost per unit is at least $8 per annum. That will pay for the gas for at least two months.

This is not to say that some people will not buy the electric range. Some people can afford a Rolls Royce, but it is whistling to keep up courage to argue that the use of electricity for heating and cooking is the way out of the utilities' dilemma.

The lowest cooking rate on the continent is that, perhaps, of the Winnipeg municipal utility, but that utility pays practically no taxes. If it paid a tax of 7 mills on each kilowatt-hour sold, as did the local utility last year, it would have to charge 1.66 cents and not 0.96 cent per kilowatt-hour for electrical energy for cooking and heating. The T.V.A.'s rate of 4 mills applies only after the customer has incurred a bill of $4.50, or after he has used 200 kw.-hr.

[*Continued on page 72*]



● There's a rumor going 'round that Frigidaire is about to make an announcement of vital importance to shrewd refrigeration dealers.

This rumor is true.

Frigidaire's Sales Plans for 1935 are almost ready. They embody, of course, all the principles that have proved sound and successful in the past—and many new ideas as well.

If *you* want to stay on the "profit" side of the ledger by swinging along with the leader—now is the time to start.

A letter will bring you advance information. Write to Frigidaire Corporation, Subsidiary of General Motors Corporation, Dayton, Ohio.

Frigidaire

PRODUCT OF GENERAL MOTORS

THE WORLD'S MOST POPULAR ELECTRIC REFRIGERATOR

LOAD HOLDING
as important as
LOAD BUILDING

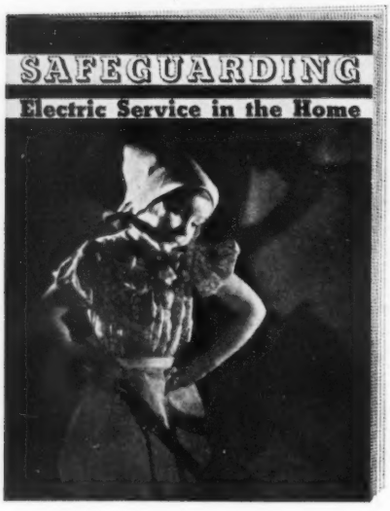
WHEN it is considered that about fifty million portable appliances are added to load yearly . . . the matter of the cords serving them is important.

Cords are reported as the most frequent troubles with electric service . . . and the most expensive to the utility in point of load lost due to outages, cost of service calls and to shelving of appliances due to cord faults.

So the nation-wide work being done with householders, dealers, department stores, utilities and manufacturers to insist on Bracelet Labeled Cord is helping to build load and to hold it.

It is a cause meriting the wholehearted cooperation of all branches of the industry.

ELECTRICAL CORD MANUFACTURERS
155 East 44th St., New York



by this label

This booklet (size 8″x 11″) is being used by utilities to promote the better use of electricity in the home. Send for a copy. It will show you how to tie in with this movement in your territory.

of energy, and this rate of 4 mills is possible only because the taxpayers of the country subsidize T.V.A. for the benefit of the residents of the Tennessee Valley.

Unless the present temper of the public changes, and that very soon, the investors in private utilities are headed for disaster. In spite of any propaganda the T.V.A. and other governmentally financed utilities put out, the government never competes fairly. This is disclosed by the subsidy given to Knoxville for a municipal plant by P.W.A., and unless the private utilities can convince the public that they are suffering from gross discrimination they are merely whistling against the inevitable.

C. M. JANSKY,
Professor of Electrical Engineering,
University of Wisconsin.

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Comments on Government and Industry

To the Editor of ELECTRICAL WORLD:

While the editorial in the October 13 issue of ELECTRICAL WORLD under the caption "Business and the New Deal" is presumably not to be taken too seriously, one may probably be permitted to disregard the thinly veiled partisan trend and in the interest of clear thinking offer some comments as they occur to a rank outsider.

These so-called established principles which are enumerated, are they really principles and are they established? Are they as unchanging as the writer of the article would have us believe?

What is the proof that the best government is a democracy? Do we know that the best form of government has finally been evolved? What is a democracy? The arguments used in the article may be good, but until we are agreed on the correctness of the premises and on the precise terms, the statements can hardly be accepted as proved even though advanced so ably.

"The second principle, that a successful democratic government must be based upon laws and institutions and not upon men," is possibly a statement of fact, but it must not be forgotten that the Administration depends upon men, and while one man's interpretation may be partially disproved it is not necessarily entirely wrong, just as another man's interpretation is not necessarily correct when it cannot be entirely disproved. The statements in the article are therefore not necessarily of fact but probably only of inference.

"The principles are unchanging," but have the principles been correctly enunciated as yet? Is not the writer of the article confusing principles with statutes, laws with regulations? Is it

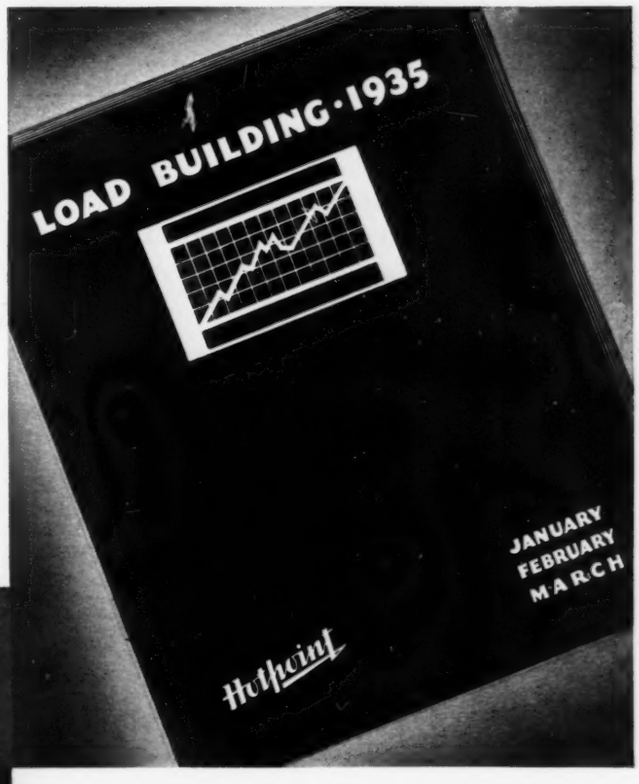
[*Continued on page 74*]

A New Load Building Plan for 1935

Start Now to *plan* your load-building activities for next year by looking over Hotpoint's new program covering planned activity for every month. This comprehensive *plan* answers the need for adding profitable revenue progressively and continuously. Utility executives know that the electric range and water heater head the list for quick and profitable load building. Now Hotpoint gives you a complete merchandising set-up to do the job.

A Complete Program, embracing planned activity for every month of the year, is the chief feature of the new Hotpoint Plan. Every utility executive interested in increasing revenue for 1935 should see the Hotpoint Plan.

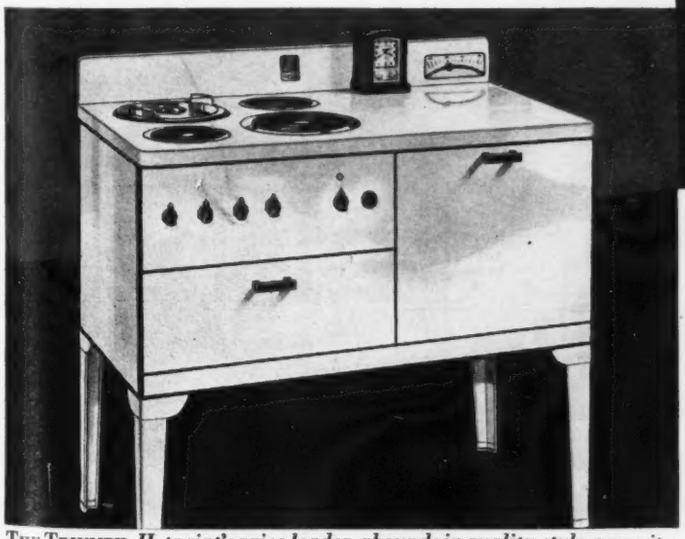
Ready Now. The first portfolio of the program, outlining plans for clearance sales, replacement activity, employee campaigns, during the months



of January, February and March, is now ready. All plans are readily adaptable to your individual requirements.

Get in touch with the Hotpoint representative in your district at once and investigate this great and timely load-building plan.

EDISON GENERAL ELECTRIC APPLIANCE CO., INC.
5618 West Taylor Street, Chicago



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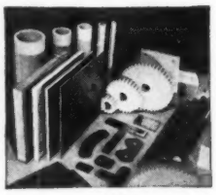

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not a fact that while principles remain unchanged the statutes and regulations by which men are induced to abide by those principles have to be changed to suit changing conditions of society? A government's enunciation of those principles as embodied in statutes may consequently appear very incomplete, but not necessarily wrong. They may indeed even be the very best at the moment.

Science is a single word used quite generally to denote a scientific method of investigation, the first step in which is the accumulation of facts or data, while the next is the formulation of theories and the experimental proof thereof. Political science, to date, is hardly worthy of the name "science" because the facts are so meager, although the present state of society the world over attests to the process of the experimental proof of theories. These experiments being performed by the heads of various governments are the result of the expressed wish, by the ballot, of that "whole people which shall decide public policies"—to quote from the article under discussion. Until those experiments have been in some measure completed no one is qualified to offer such dogmatic assertions as some of those by the writer of the article. In the course of the experiments, reactions or even explosions are bound to take place, but those who are impotent in the face of an explosion are hardly competent to criticise the person detailed to carry on the experiment, especially if the decision has to be made as to which explosion is likely to be the least violent.

If the chief barrier to recovery is the uncertainty which is feeding the fear of the future; if this is the missing spark from business recovery, where, oh where, is the vaunted courage and resourcefulness of our wonderful captains of finance? Was the future any more certain for the pioneers who hewed out their homes in the forest, fought the Indians at home and the Tory exploiters in England, enduring untold privations in the process? If the same lack of fortitude had been displayed by those pioneers, if that sturdy stock had folded up like our wonderful captains, who would have laid the foundations of the great republic whose people have been exploited by these same captains and who are in danger of being exploited by them again as soon as the stage can be properly set?

To an unbiased observer it would appear that the missing spark referred to in the article can be most aptly indicated by the use of a single word having an old Saxon root but considered too vulgar to be used in polite society. The product is largely used in the manufacture of violin strings and as casings for sausages.

R. G. Matthews,
Toronto, Canada.

Another News Story . . .

Simple Off-Peak Rate Bids for Full-Use Homes

By It Middle West Utilities Company Is Getting Idle Ranges Working Again and Making One-Cent Water Heating Load Possible and Profitable

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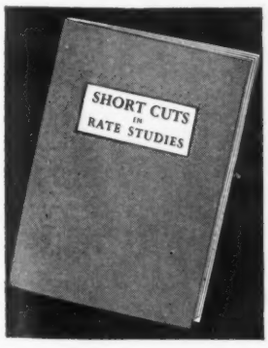

Write for an outline of the service and the booklet, "Short Cuts in Rate Studies."

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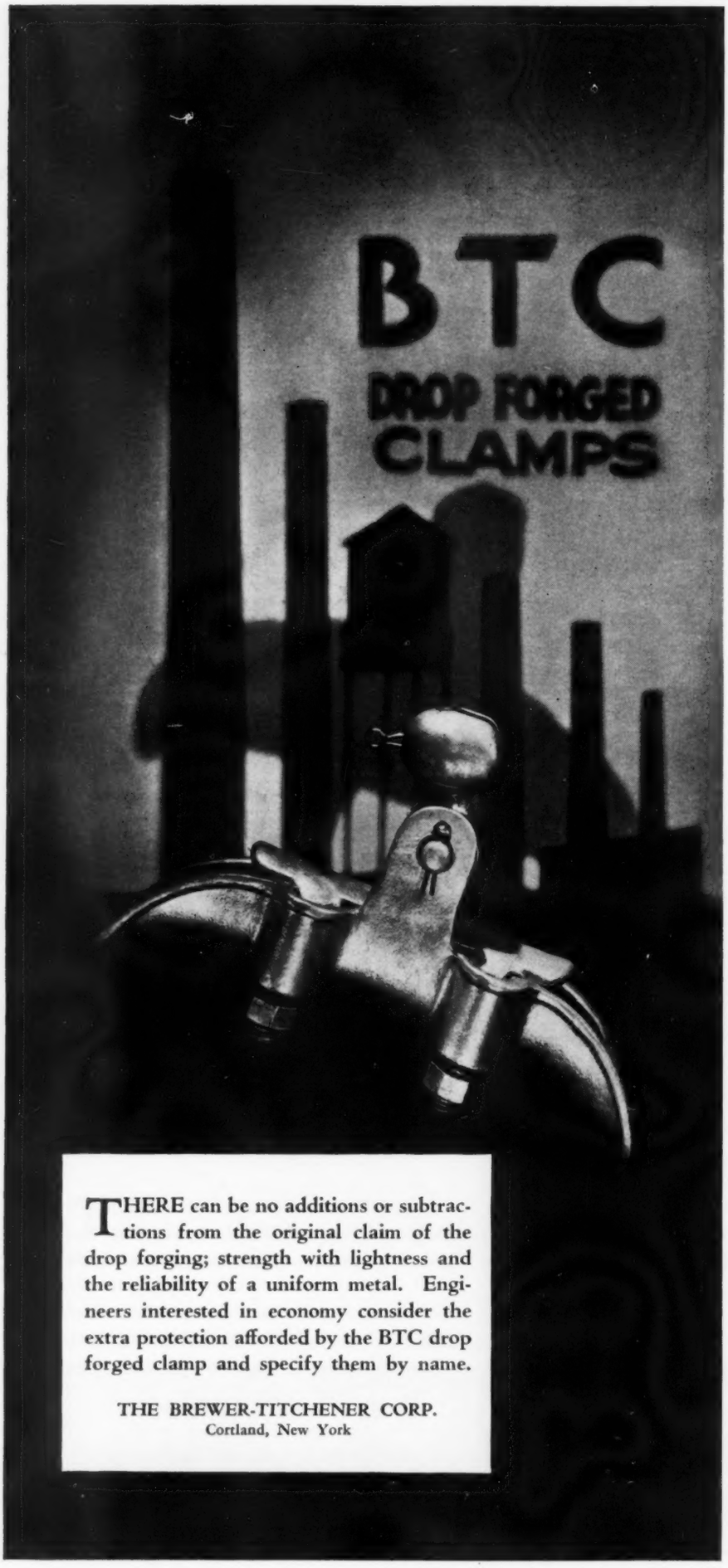

THERE can be no additions or subtractions from the original claim of the drop forging; strength with lightness and the reliability of a uniform metal. Engineers interested in economy consider the extra protection afforded by the BTC drop forged clamp and specify them by name.

THE BREWER-TITCHENER CORP.
Cortland, New York

Selling the Unprofitable Customer

[*Continued from page 27*]

of 11,462 units, a commission of 50 cents per iron on all sales, and an extra bonus of 15 cents for each sale made to a minimum bill customer—that is, one using 15 kw.-hr. or less. About 15,000 irons were sold by employees, around 2,500 to minimum customers. We sold a standard quality flatiron priced at $2.50, on terms of 50 cents down, 50 cents a month. Many employees canvassed house-to-house and chose the poorer sections as offering them the best sales possibilities.

Homes of the unprofitable customers generally are poorly lighted and an excellent market for increased consumption. Our home service division has been most active in working with these customers and our employees placed in these homes the majority of 7,500 wall lamps sold by them in a 30-day lighting campaign in October. These customers also bought many of the 145,000 "Mazda" lamps sold by employees in the same period. In the educational work being done on lighting among our employees, the important minimum bill customer market is being emphasized. Both employees and home service representatives have had difficulty in selling this market, due to the lack of electrical outlets in the homes of customers, so an all-employee campaign on electrical outlets has been planned for early 1935.

In spite of the attitude of many utility executives who insist that we will always have the minimum bill customer with us, I insist on saying that the way to make an unprofitable customer a profitable one is to make it possible for him to use enough electric service for his minimum charge to make him *want* to use even a little bit more. Then when he finds that electricity is not as expensive as he might have thought, to make him *want* to add more appliances and more lighting. To do this the widely accepted small appliances, such as the iron, should be made available to such customers in a quality—not, by any means, cheap—article at prices and on terms which he can afford to meet. Lastly, we believe that the best way to sell electric service to the small customer is to go about selling it to him aggressively and wholeheartedly, to the ultimate benefit of the customer as well as the company.

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MEN OF THE INDUSTRY

A. R. McDonald Heads Commissioners' Association

Andrew R. McDonald, member of the Wisconsin Public Service Commission, was elected president of the National Association of Railroad and Utilities Commissioners at the recent convention held in Washington, D. C. Mr. McDonald is one of the veteran public service commissioners of the country. Since 1923 he has been a member of the Wisconsin Public Service Commission and its predecessor, the Wisconsin Railroad Commission, and has had the guidance of the commission's policies in the transportation field as his special work.

First as chairman of the national association's legislative committee and later as association first vice-president and chairman of its executive committee, Mr. McDonald played an important rôle

A. R. McDonald

in the passage of the Johnson Act and the Federal Communications Act.

Mr. McDonald was born in Saginaw County, Mich., in 1878 and had worked 23 years in the railroad field when the late Governor John J. Blaine appointed him to the Wisconsin commission in 1923. He was admitted to the bar in 1931.

▶ F. E. Sellman has been elected vice-president of Servel, Inc. He was formerly vice-president of Servel Sales, Inc., and Electrolux Refrigerator Sales, Inc., which have been merged into the parent organization.

▶ Robert G. Hunt, vice-president of the Byllesby Engineering & Management Corporation and the Standard Gas & Electric Company, has resigned. Mr. Hunt spent 39 years with the Byllesby organization and predecessor companies.

Following some eight years' experience in railroad work, Mr. Hunt in 1895 was appointed general manager of the Fort Smith Light & Traction Company, Fort Smith, Ark., serving in that capacity for ten years. In 1905 he was made manager of San Diego Consolidated Gas & Electric Company and one year later was transferred to Chicago and appointed assistant to Arthur S. Huey, vice-president in charge of operation, H. M. Byllesby & Company. He was elected vice-president of the company in charge of property acquisitions in 1923.

▶ C. E. Harger, who has been manager of the northern division of the Wisconsin Michigan Power Company, has been appointed superintendent of power of the company's system.

▶ J. A. Kennedy has been appointed vice-president and comptroller of the Northern Indiana Public Service Company, Hammond, in charge of accounting and finance.

▶ Dr. T. H. Hogg has been appointed a member of the main committee of the Canadian Engineering Standards Association to succeed Dr. F. A. Gaby, resigned. Dr. Hogg is chief hydraulic engineer of the Ontario Hydro-Electric Power Commission.

▶ George Furbush has been appointed superintendent of stations for the Central Maine Power Company, following 32 years' service with that organization. He spent eight years as a station operator, then served for three years as chief operator, and since 1911 has been attached to the department of maintenance and inspection.

▶ Julius Daniels, assistant superintendent of the promotion department of the Edison Electric Illuminating Company of Boston, previously its illuminating engineer, and a past-president of the Illuminating Engineering Society, has been made chairman of the lighting sales committee of the Edison Electric Institute.

▶ J. W. Speer has been assigned to represent the National Electrical Manufacturers Association at Washington with the Federal Housing Administration as industry adviser to the electrical manufacturing industry. Mr. Speer has spent many years in the electrical manufacturing industry with the Westinghouse interests. He will devote his entire time to promoting electrical industry co-operation with the Federal Housing Campaign and working out plans for the electrical industries capitalizing on this campaign.

C. H. Lehman Appointed Blaw-Knox Vice-President

Chester H. Lehman has been appointed vice-president in charge of sales of Blaw-Knox Company. Mr. Lehman was

C. H. Lehman

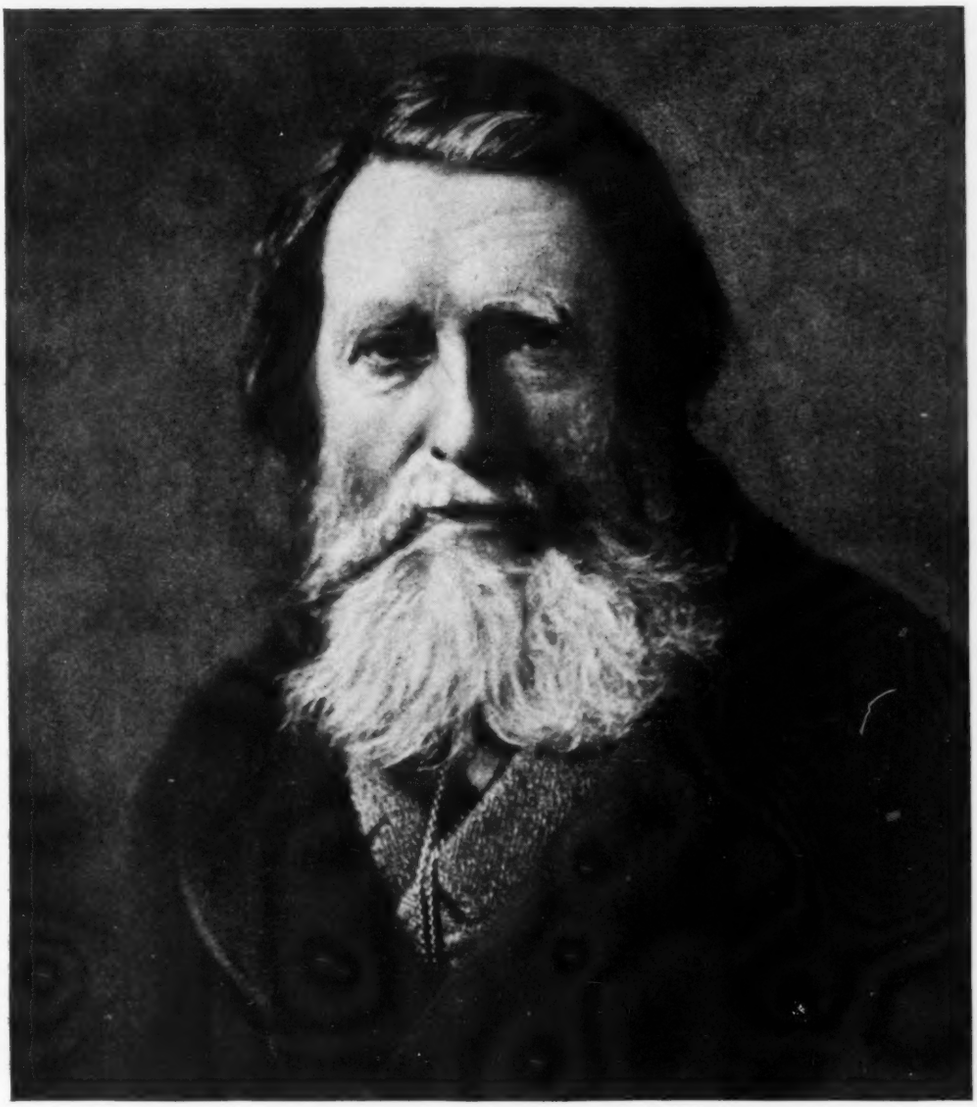
previously secretary of the company. H. B. Loxterman, who has been with the company since its organization 28 years ago, succeeds Mr. Lehman as secretary and becomes a director in the place of Howard Sachs, resigned.

▶ Dr. Leo Hendrik Baekeland, president of the Bakelite Corporation and inventor of Bakelite resinoid, was made the recipient of the honorary degree of doctor of applied sciences by the University of Brussels, Belgium, during the centenary celebration observed this month.

▶ George Sherry has been appointed general merchandise manager for the General Cable Corporation. H. B. Tompkins, formerly manager of supply sales of the General Electric Supply Corporation, has been made general sales manager for General Cable.

▶ C. V. Woolsey has been appointed director of the inventory of the Brooklyn Edison Company, heading the department of the inventory, which has just been organized. The function of the new department is to set up a complete list of all the units of property on the system, establish the original cost of these units as closely as it can be determined, and arrange the final record so as readily to permit a continuing record of all future additions and withdrawals of units of property. Mr. Woolsey has been with the Brooklyn Edison Company since 1909, serving successively as assistant to the electrical en-

• • • There is hardly anything in the world that some man cannot make a little worse and sell a little cheaper, and the people who consider price only, are this man's lawful prey. —RUSKIN



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A-032

SUPERHEATERS • AIR PREHEATER • GRIFFIN HOT BLAST • WATER WALLS • ECONOMIZERS

gineer, electrical system engineer, and system engineer, holding the last title for several years prior to his present appointment.

▶ WILLIS H. CARRIER, chairman of the board of the Carrier Corporation, Newark, N. J., has been awarded the medal of the American Society of Mechanical Engineers for 1934 for research in air conditioning.

▶ BAYARD HODDER, formerly manager of the New England district office of the Cutler-Hammer Manufacturing Company, has been appointed general sales manager, with headquarters at Milwaukee, Wis. He has been succeeded at Boston by WALTER E. ADDICKS, formerly chief engineer of the company's New York factory.

▶ D. W. ATWATER has been appointed manager of the commercial engineering department of the Westinghouse Lamp Company. A graduate of Stevens Institute of Technology, Mr. Atwater joined the commercial engineering department following the World War as an illuminating engineer. For a number of years he has co-operated in the design of all the important Westinghouse lighting installations.

▶ SIR ANDREW DUNCAN has resigned as chairman of the Central Electricity Board, London, England, to become first independent chairman of the British Iron and Steel Federation. The construction of the national Grid network was completed over a year ago, ahead of schedule time. Sir Andrew has been the responsible head of the Board during the entire period of construction, having been its chairman since its formation in 1926.

▶ L. D. O'CONNELL, formerly industrial division manager for the St. Louis office of the Westinghouse Electric & Manufacturing Company, has been appointed manager of air conditioning. In his new position, Mr. O'Connell will have supervision over sales, engineering and manufacturing activities of all air conditioning apparatus.

▶ JAMES S. MAHAN has been employed by the Edison Electric Institute to present the views of the electric utilities on National Electrical Code questions in the field. Various comments in the technical press and elsewhere concerning the recent proposals of the electric light and power group for editorial revision of the code, as well as other wiring developments advocated by that group, have made it appear that the aims and purposes of central stations in this field have been misunderstood by some commentators. Mr. Mahan will endeavor to explain and clarify these matters and in this connection he will travel extensively. He was formerly an electrical inspector connected with the Western Actuarial Bureau and was for many years a member of the electrical committee of the National Fire Protection Association. More recently he has been connected with various manufacturers of electrical wiring materials.

▶ FRANK R. PHILLIPS, president of the Philadelphia Company, was elected president of the American Transit Association at the recent annual convention held in Cleveland, Ohio.

▶ BENJAMIN V. COHEN has been appointed counsel of the National Power Policy Committee. Mr. Cohen was formerly associate general counsel of the Public Works Administration concerned especially with railroad loans. A graduate of Harvard and University of Chicago Law Schools, Mr. Cohen is a member of the New York and Illinois bar.

▶ LOUIS A. FIORANI has assumed his new duties as merchandising manager of the New England Power Association and its affiliated utilities, with headquarters at Boston (ELECTRICAL WORLD, November 24, page 78). Mr. Fiorani is one of the best known sales executives in the New England field.

L. A. Fiorani

▶ J. D. KERESEY, president of the Anaconda Wire & Cable Company, and G. H. BUCHER, president of the Westinghouse Electric International Company, have been elected directors of the American Manufacturers Export Association.

▶ L. P. MONTI, associate engineer, has been placed in charge of the San Francisco office and testing station of Underwriters' Laboratories.

▶ GEORGE N. BROWN, for the past three years manager of Electric Refrigeration Bureau, Edison Electric Institute, New York, has been appointed special utilities sales representative for Kelvinator Corporation, with headquarters in New York. Mr. Brown was formerly identified with the Ohio Insulator Company and the Pittsburgh Transformer Company. He is a member of the American Institute of Electrical Engineers.

OBITUARY

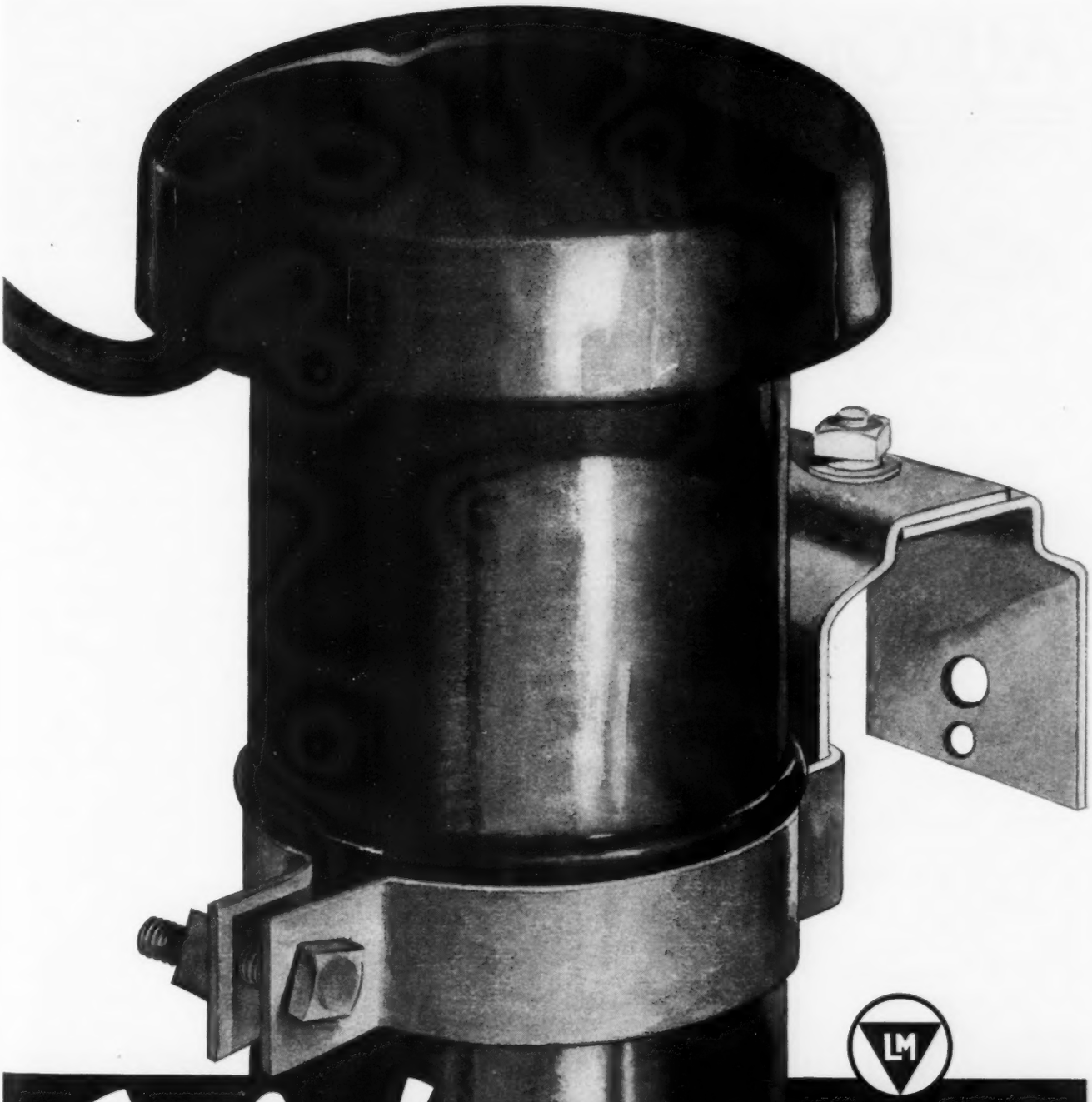
▶ PHILIP F. CREASY, for the past eight years power engineer for the Waterbury district of the Connecticut Light & Power Company, died suddenly December 2 at the age of 34. Following graduation from Pennsylvania State College as an electrical engineer in 1923, Mr. Creasy spent three years in the consulting engineering department of the Westinghouse Electric & Manufacturing Company at East Pittsburgh. He then joined the staff of the Connecticut Light & Power Company. Mr. Creasy was born in Dalton, Pa.

▶ G. F. BROWN, manager of the generator and converter division of the central station department of the General Electric Company and for many years a prominent figure in the field of hydro-electric engineering, died November 26 at Roxbury, Mass. Mr. Brown was a leader for the past fifteen years in the application of waterwheel generators to many of the major hydro-electric developments in this country. He was a member of the American Institute of Electrical Engineers.

▶ W. R. POWER, division manager of the Appalachian Electric Power Company at Huntington, and formerly president of the Public Utilities Association of West Virginia, died in a Huntington hospital November 18 after a week's illness. Mr. Power was active in the formation of the Public Utilities Association of West Virginia and also served a term as president of the east central division of the National Electric Light Association. He had been connected with the Huntington properties since 1912.

▶ HARLEY P. WILSON, public utilities executive, died November 23 at the age of 61 in his home in Alexandria, Va., after a long illness. A pioneer in the field of hydro-electric development, Mr. Wilson was instrumental in organizing the Western Power Corporation in 1906, which he headed as president until 1925, when it became a subsidiary of the North American Company. He was at his death a director of both companies. As president of Western Power, Mr. Wilson had a large part in organizing its former subsidiaries, the Great Western Power Company of California and the California Electric Generating Company, and in purchasing the San Joaquin Light & Power Corporation, another former subsidiary. The Pacific Gas & Electric Company now controls the Great Western, California Electric Generating and San Joaquin companies. He was also a director of the Washington Railway & Electric Company and the Potomac Electric Power Company of Washington.

[*Continued on page 82*]



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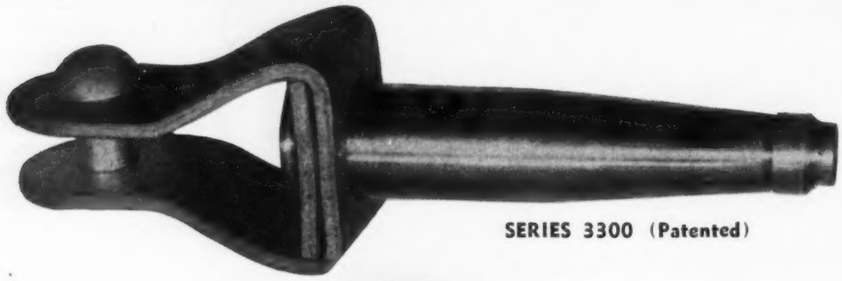

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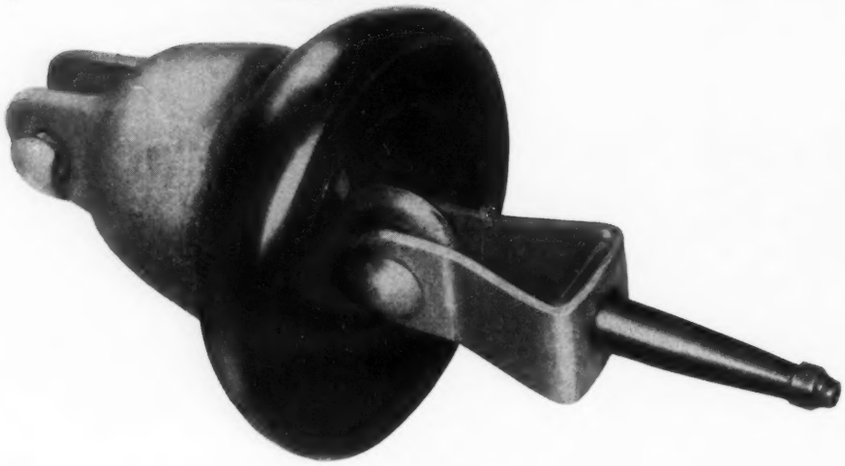

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Use it with any make of disc type strain insulator regardless of size and having either eye bolt or clevis attachment. Made in sizes to accommodate any conductor from No. 6 AWG. up to and including 250 MCM. The big feature, important to you, is the inclusion of the well known, long tried and approved principle of the AUTOMATIC LINE SPLICE Connector unit as the means of conductor attachment.

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▶ UMBERTO BALLANTI, one of the leading Italian authorities in the electric traction field, died recently in Rome at the age of 58. Mr. Ballanti was a member of the International Electrotechnical Commission.

▶ MALCOLM R. PITT, a director of the Connecticut Light & Power Company, died recently at his home in Stamford, Conn. Mr. Pitt was also a director of the Citizens' Savings Bank and the Stamford Trust Company.

▶ CLARENCE B. GRUNDY, lighting engineer with the General Electric Company at Schenectady, died October 24 in that city, after a five months' illness. Mr. Grundy had been connected with the General Electric Company since 1912.

▶ FRANK C. COSBY, for many years New England district manager of the Standard Underground Cable Company, with offices at Boston, died recently in Brookline, Mass. He was born in San Francisco, Calif., in 1869; entered the company's service in 1896, and retired from business about four years ago.

▶ R. E. WILLSLEY, formerly president of the West Canadian Hydro-Electric Corporation, Vernon, B. C., died recently at Evanston, Ill. At the time of his death Mr. Willsley was engaged in the investment banking business in Chicago, having resigned from the presidency of the British Columbia utility in 1932.

▶ HARRY KORNFELD, engineer of building design for the General Electric Company at the Pittsfield branch of the company, died suddenly at his home in that city November 8, at the age of 47. He was born in New York City in 1887, graduated from Cornell University in 1911, and after other engineering work entered the employ of the General Electric Company in 1919.

▶ PROF. WELLESLEY C. CLINTON, holder of the Pender chair of electrical engineering at University College, University of London, England, died in London recently. For more than 40 years he taught electrical engineering at University College and during that period was associated with Prof. Sir Ambrose Fleming. Professor Clinton was educated at Finsbury Technical College. In 1893 he accepted the position of demonstrator at University College, when the present engineering laboratories were opened, and he served in one capacity or another as assistant to Professor Fleming, on whose retirement, in 1926, he succeeded to the chair of electrical engineering. He was elected dean of the faculty of engineering for 1934-35, but he did not live to take office. Professor Clinton, who was a member of the Institution of Electrical Engineers, made numerous contributions to the technical press.

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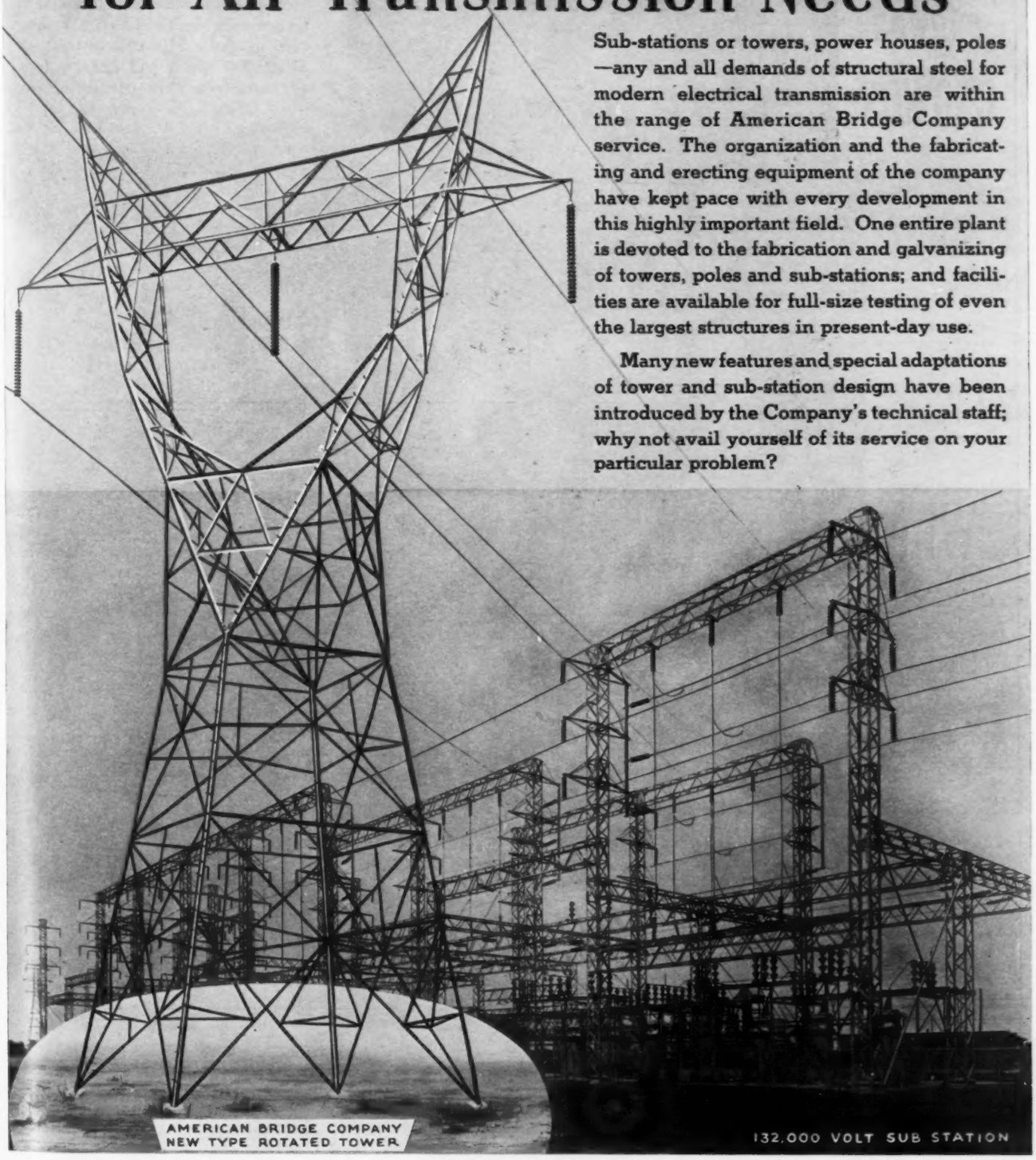
Sub-stations or towers, power houses, poles —any and all demands of structural steel for modern electrical transmission are within the range of American Bridge Company service. The organization and the fabricating and erecting equipment of the company have kept pace with every development in this highly important field. One entire plant is devoted to the fabrication and galvanizing of towers, poles and sub-stations; and facilities are available for full-size testing of even the largest structures in present-day use.

Many new features and special adaptations of tower and sub-station design have been introduced by the Company's technical staff; why not avail yourself of its service on your particular problem?



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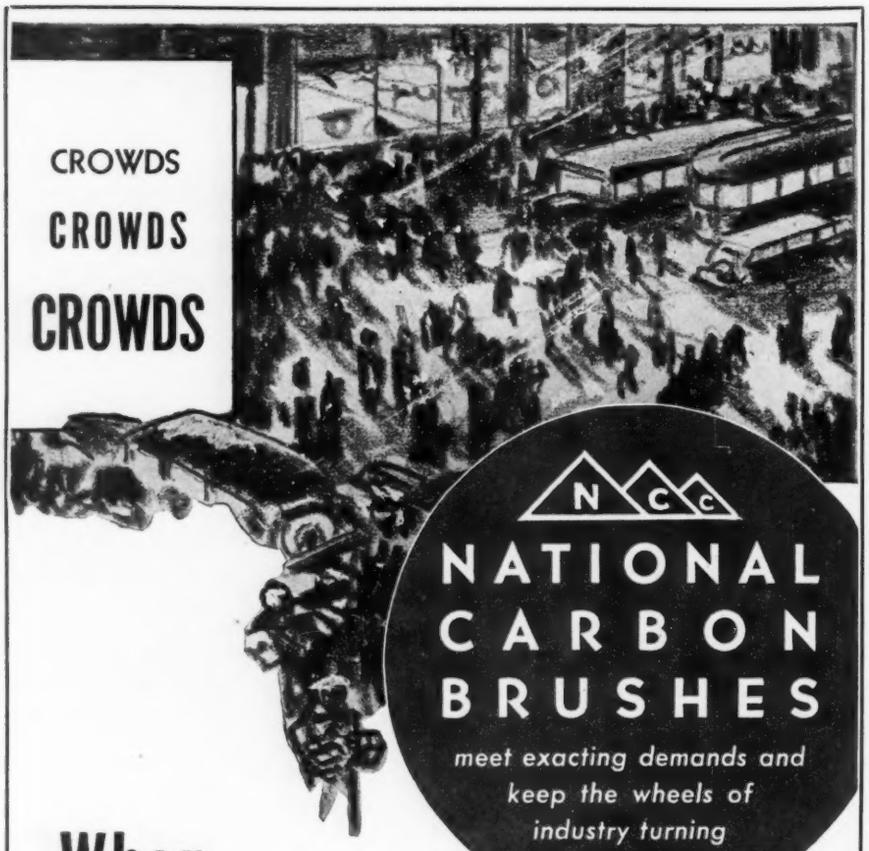
Pacific Coast Distributors: Columbia Steel Company, Russ Building, San Francisco — *Export Distributors:* United States Steel Products Company, New York



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They have proved their reliability on power, transit and industrial equipment.

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Recent Rate Changes

Detroit Edison Company's rate case has been ordered continued by the City Common Council, following the charge by Assistant Corporation Counsel James H. Lee that by means of legal technicalities the Michigan Public Utilities Commission had accepted a rate reduction of only $108,000 instead of the $1,500,000 which had been ordered by the commission. In a letter to the Common Council in reply to Mr. Lee's charges, James V. Oxtoby, of counsel for the utility, asserted that the company's commercial customers are saving $1,700,000 annually by new optional rates. "In addition," said Mr. Oxtoby, "the company has filed a new rate, its general commercial rate, to which some 35,000 customers have transferred."

•

Pennsylvania Public Service Commission has announced that sixteen utility companies operating in virtually every part of the state have agreed to cut rates approximately $1,413,829 annually. All classes of utility service companies are included. The electric companies making the voluntary reductions are: Scranton Electric Company, $230,000; Luzerne County Gas & Electric Company, $162,500; Erie County Electric Company, $90,000; Stoufferstown Electric Company, saving not yet known; Erie Lighting Company, $75,000; Metropolitan Edison Company, $472,000; Edison Light & Power Company, $125,000, and the Keystone Public Service Company, $54,000.

•

Georgia Public Service Commission has ordered all power companies to show cause on December 10 why rates under commercial power schedules should not be reduced.

•

Bronx Gas & Electric Company and the Yonkers Electric Light & Power Company have obtained stays from Supreme Court Justice Ellis J. Staley of Albany against temporary rate reductions, pending disposition of certiorari proceedings in the Appellate Division. Justice Staley limited the duration of the stay until May 24, 1935.

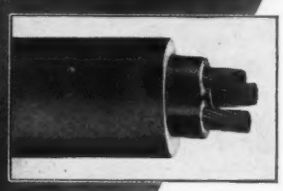
•

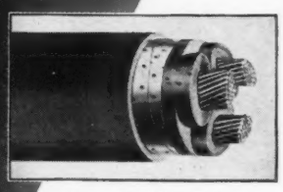
Florida Power & Light Company, summarizing its legal contentions in answer to the city's action for a 33 per cent reduction in rates, in a 350-page brief filed with F. M. Hudson, special master, maintained that the electric light and power rate in Miami must be based on rate of return not only in Miami but in the interconnected system wherever used for local service. The company says it is now making a return of only 6 per cent on its investment and this would be cut to 3 per cent if the city rate reduction ordinance were enforced.

ROEBLING *Varnished Cambric* CABLES

The Roebling Varnished Cambric Cable shown above is 3-conductor, lead encased. It is merely one of many types of varnished cambric cables made by Roebling.

These Roebling Cables are available in single, two and three-conductor types; for a wide range of voltages; in gauges from No. 14 B. & S. to 2,000,000 circular mils. Braided or leaded. Also with steel, zinc or bronze tape, or round wire steel armor.





Above: Roebling Paper Insulated Cable.

Top: Roebling Rubber Insulated Cable.

OVER 60 OTHER TYPES

Power Cables: Paper; Cambric; Rubber » Parkway Cable » Tree Wire » Service Cables » Station Cables » Rubber Covered Control Cables » Rubber Covered Wires and Cables: Code; Intermediate; 30% and 40% Performance; 35% and 40% Performite; Plain Rubber 60% Sheath Power Cable and 40% or 60% Sheath Flexible Cords » Slow Burning Wires and Cables » Weatherproof Wires and Cables » Submarine Cables » Portable Cords » And a wide variety of other wires and cables.

JOHN A. ROEBLING'S SONS CO., TRENTON, N.J.

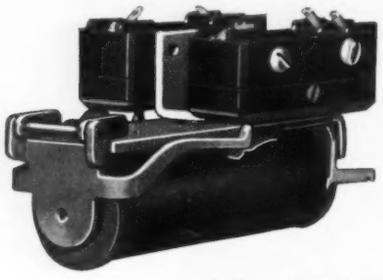
Branches in Principal Cities

ONLY A FINE PRODUCT MAY BEAR THE NAME ROEBLING

NEW EQUIPMENT

Relays for Remote Control Purposes

A series of relays for miscellaneous remote-control purposes and which are suitable for switching a.c. loads with very small d.c. controlling currents (6 to 220 volts) has been announced by



Automatic Electric

the Automatic Electric Company, Chicago. Operating time is 0.002 to 0.010 second and release time 0.005 to 0.250 second. The contacts of the microswitch are rated as break contacts, 10 amp.; make contacts, 6 amp., at 110 volts, a.c.

•

Telephone Instrument Operates Without Batteries

A telephone instrument which operates without batteries or any other external source of electric current has been announced by the Automatic Electric Company, Chicago. This telephone is known as the "Magnetic Monophone." The magnetic unit is at once a very efficient receiver and transmitter of unusual sensitivity, requiring no battery supply whatever. It produces pure, crisp tones which are free from distortion as well as from the frying noises which sometimes occur in carbon microphones, it is claimed.

In fundamental design the magnetic telephone unit is similar to the type of magnetic loudspeaker unit in which an armature vibrates between the poles of a very powerful permanent magnet and actuates a diaphragm to which the armature is attached by a sturdy but very light connecting link.

When two units are combined to form a handset, they may be connected in series or in multiple. Several units may be connected to one line, and each handset is designed to accommodate a cut-out switch to disconnect those not in use. Tests have shown excellent commercial transmission over 20 miles of standard cable and intelligible conversation over 30 miles. In a good copper circuit of open wire conversation is possible over 200 to 300 miles.

•

Oilproof Synthetic Rubber

An oilproof synthetic rubber, designated as "Thiokol B," has been announced by the Thiokol Corporation, Yardville, N. J., which has redesignated the original material as "Thiokol A." Thiokol B is different in chemical composition and, in addition to its solvent, ozone and corrosion resistance, it has only a very mild odor and does not generate gas in processing.

Thiokol B does not have an irritating, lachrymatory effect upon the eyes during processing or at curing temperatures. Special hooding or ventilation is unnecessary. It is especially adaptable where flexibility at extremely low temperatures and excellent solvent resistance are desired and will remain flexible at very low temperatures.

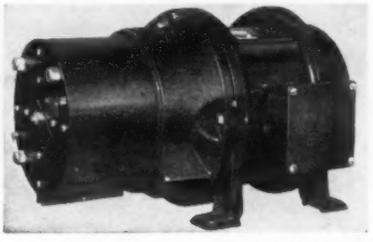
•

ALTERNATING-CURRENT, ACID-RESISTING MOTOR to operate under adverse conditions in chemical plants has been developed by the Crocker-Wheeler Electric Manufacturing Company, Ampere, N. J. All parts in contact with the external cooling air are made of acid-resisting materials.

•

Disk-Type Electric Brake

A compact, smooth-acting, disk-type electric brake, designed for mounting directly on a number of types of General Electric motors, has been announced. The brake is intended especially for



General Electric

controlling small hoists, cranes, winches and similar equipment. It is suitable for applications requiring no more than 50 lb.-ft. braking torque on a continuous basis, or 74 lb.-ft. on an intermittent basis, it is claimed.

Automatic Dead End and Clevis Assembly

An automatic dead-end and clevis assembly that may be used with any make or size of the disk type of strain insulator is announced by the Electroline Company, Chicago. The automatic

Electroline

feature comes from the use of an Electroline automatic line splice connector unit as the means of conductor attachment. This results in a great saving of time and material in making dead ends. Tests of this assembly in combination with a 6-in. disk type of insulator showed holding power greatly in excess of the rated strength of hard-drawn copper wire. It can be used with any disk type insulator in service having either eyebolt or clevis attachment and for any conductor size from No. 6 up to and including 250,000 circ.mil.

•

LINEMAN'S PROTECTOR AND HOSE has been announced by Insulation Products, Inc., Torrance, Cal. This "Defiance" protector has an endless dry channel which prevents the film of water on the outside of the protector from contacting the wire and furnishing a conductor for the current from the wire to a lineman's body.

A CIRCULAR SLIDE-RULE CALCULATOR for wire problems has been announced by Lightning Calculator Company, 8 Henry Street, Bogota, N. J. It is on letter-size six-ply card and solves problems in coiling, voltage drop, weight, resistance, etc., for copper, aluminum, silver, brass, nickel, nichrome, manganin and constantan. Three similar calculators are available for Ohms law, resonance and radio problems. Each is priced $1.

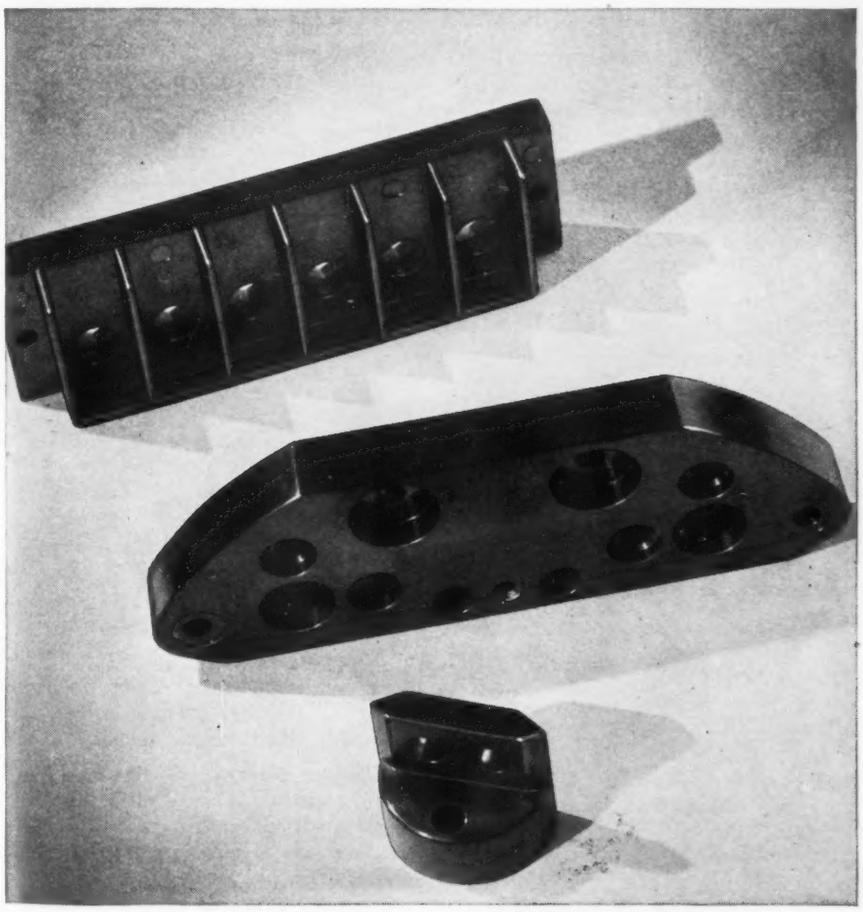
PYRANOL - TREATED PAPER - INSULATED CABLE has been announced by the General Electric Company. Pyranol is a

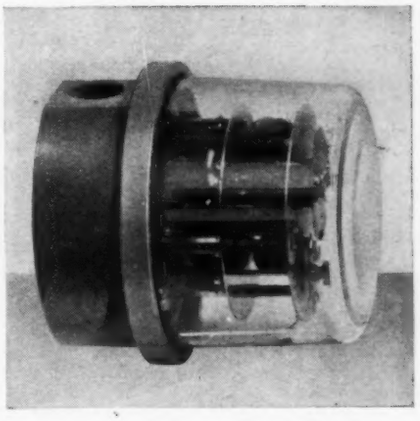
INDOORS OR OUT . . .

Location doesn't affect this Time Control —with Bakelite Molded insulation parts

"MOUNT IT ANYWHERE, indoors or out", the makers tell purchasers of the new Paragon Time Controls. One reason this is possible is the use of Bakelite Molded for insulation parts. Terminal blocks, socket mountings, switches and base insulators have the high resistance to moisture and extremes of heat and cold for which Bakelite Molded is known.

Besides thoroughly dependable insulation under any weather conditions, Bakelite Molded contributed other desirable advantages. It aided in attaining compact design and economical production, both of which are important to this manufacturer.





Among the other properties of Bakelite Molded which make it generally suitable for insulating electrical apparatus and devices are: stability, strength, and durability; resistance to chemicals and chemical fumes, and to oils and greases. Illustrated booklet 3M, "Bakelite Molded", gives full information and may suggest opportunities for using this material to meet your requirements. Copy sent promptly on receipt of your request.

★

(Left:) Terminal block and other parts of Bakelite Molded used in the various Time Controls made by Paragon Electric Company, Chicago, Ill. (Above:) One of the new Paragon "meter type" Time Controls.

BAKELITE CORPORATION, 247 Park Avenue, New York, N. Y. . . . . 43 East Ohio Street, Chicago, Ill.
BAKELITE CORPORATION OF CANADA, LIMITED, 163 Dufferin Street, Toronto, Ontario, Canada

BAKELITE

REGISTERED U. S. PAT. OFF.

The registered trade marks shown above distinguish materials manufactured by Bakelite Corporation. Under the capital "B" is the numeral sign for infinity, or unlimited quantity, it symbolizes the infinite number of present and future uses of Bakelite Corporation's products.

THE MATERIAL OF A THOUSAND USES

substance which volatilizes at arc temperatures but produces no inflammable gases. It is an effective fire extinguisher in both its liquid and volatilized forms and tends to snuff out any combustion or smoldering in the paper insulation. At present this type of insulation is limited to 600 volts and is adapted to low-voltage network cables only.

•

Hand Grinder

Dumore

Hand grinder for grinding dies and molds for cleaning up weld spots has been announced by the Dumore Company, Racine, Wis. Although the motor develops ⅛ hp., the tool only weighs 7 lb. A feature of the grinder is an effective air filter which keeps all the grinding dust and dirt out of both motor and bearings. It has a vacuum cleaner type of ventilating fan which prevents heating even when the tool is used on production work. The tool is equipped with three ball bearings and operates at a speed of 14,250 r.p.m. and has either a spade or side type of handle.

•

A.C. Arc Welding Equipment

A complete line of alternating-current arc-welding equipment, including transformer units, electrodes and automatic welding heads and control, has been announced by the General Electric Company. The new a.c. equipment is intended for heavy-current welding, primarily automatic welding because of the heavy currents involved, but otherwise equally well suited to hand applications. A.C. arc welding is not new, but the remarkable development of arc-welding electrodes during the last few years has only recently made it possible to benefit from the major advantage of the a.c. process, that being the absence of magnetic blow in the arc, and therefore superior quality in the resulting weld.

The transformer units are available in three sizes having one-hour ratings of 500, 750 and 1,000 amp. Primaries are wound for 220, 440 and 550 volts, 60, 50 or 25 cycles, single phase. Extra attachments are available for reducing the secondary open-circuit voltage to approximately 50 per cent of its normal value, normal being 80, 90 or 100 volts, and for obtaining currents down to 10 per cent of the one-hour rating.

Humidity Controller

Foxboro

Rotax indicating relative humidity controller which maintains humidity by operating solenoid valves and motor valves on water, air or steam lines has been announced by the Foxboro Company, Foxboro, Mass. The relay set required to accomplish this is located inside the case. It can be used to operate unit heaters, control dampers, air washers and other air-conditioning apparatus.

•

Service-Drop Cable

Tamper-proof service-drop cable has been announced by the General Electric Company. With its concentrically wound wire, the cable introduces a new conception of cable for connecting the pole line of the street distribution system with the service entrance on the side of a building or the entrance bushing of an outside meter. This new design makes theft of current difficult and practically impossible without leaving evidence.

Tamper-proof cable may be obtained with two or three conductors, armored or unarmored, as the particular application may require. If desired, a round three-conductor cable, unarmored only, is available. Four types are available.

•

75-Amp. Lincoln Welder

Lincoln Electric

An arc welder for thin sheets, plates and shapes is a new unit announced by the Lincoln Electric Company, Cleveland, Ohio, for use on 110 to 550 volts a.c. This welder, known as the SA 75, will deliver as low as twenty arc amperes without auxiliary devices, it is claimed. Using electrodes as small as $\frac{1}{16}$ in., it can be employed on materials as light as 24 gage.

ENGINEERING DATA FROM MANUFACTURERS

Bulletins and catalogs now available to engineers by manufacturers and associations

Connections, ratings, weight and list prices of Sorgel Electric Company (435 N. Plankinton Avenue, Milwaukee, Wis.) air-cooled transformers with conduit connections (¼ to 50 kva.) and booster transformers of similar design (1 to 500 kva.) are described in new bulletins 734 and 734-B respectively.

"Electrical Energy Diversion," a report (B-10, October, 1934) of the electrical equipment committee of Edison Electric Institute, 420 Lexington Avenue, New York, summarizes experience, detection methods, prevention measures and costs of rehabilitation of service installations. Price, 50 cents to U.S.A. non-members.

Detailed instructions for installing and operating the No. 84 coil-winding machine of the Universal Winding Machine Company of Boston are in a new 21-page pamphlet.

Operating and construction features of luminous tube transformers with dimensional data, loading, timing and power-factor improvement practice are in a new General Electric Company 34-page booklet No. 5248.

Bulletin No. 112 of Lapp Insulator Company, LeRoy, N. Y., discusses ratings and application of line-post insulators from 20 to 66 kv.

New catalog No. 25 lists application data and methods for Arrow wiring devices of the Arrow-Hart & Hegeman Company, Hartford. 57 pages.

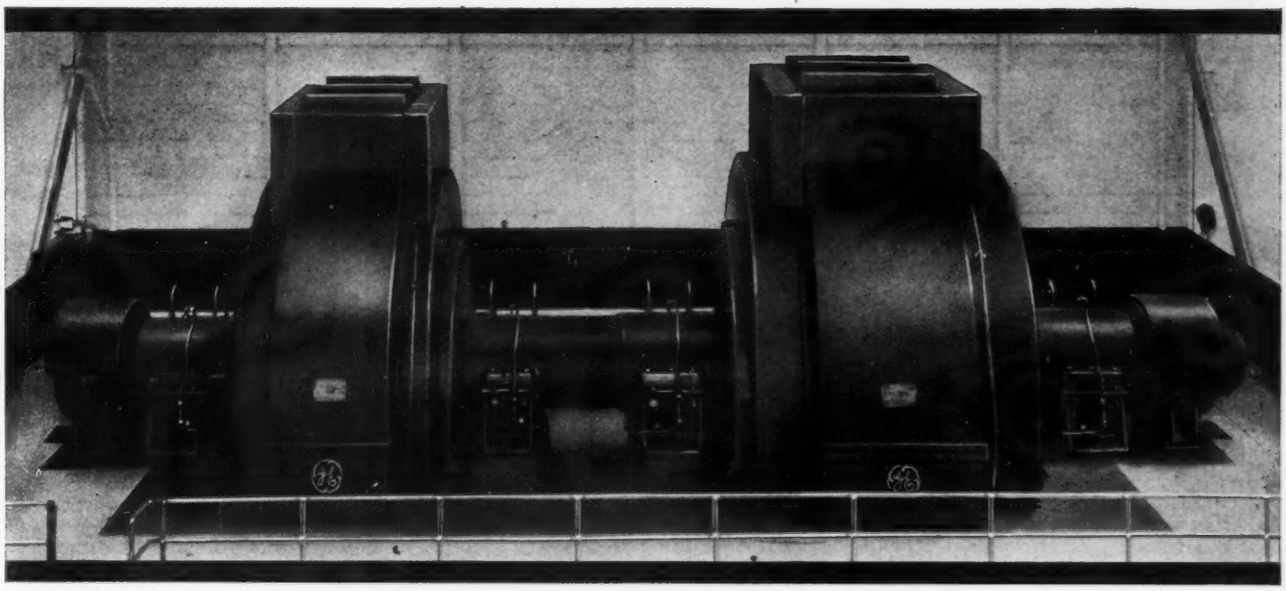
"Weston Relays" in 12 pages gives characteristics and uses of Weston Electrical Instrument Corporation, Newark, N. J., relays of toggle, polarized, power, timing and photronic types.

"Temperature-Limit Control of Furnace Roofs" is the title of Bulletin 53-116 of Leeds & Northrup Company, Philadelphia, presenting detailed specifications and application of this new heat control apparatus.

Roller-Smith Company, New York, has just issued Catalog No. 5 (14 pages), giving detailed structural features and mounting dimensions of the new Type HD air-circuited breakers with completely inverted brush, secondary and carbon contacts.

OXYGEN-FREE HIGH CONDUCTIVITY COPPER.....IN THIS 30,000 KVA FREQUENCY CONVERTER

built by General Electric for Public Service Electric and Gas Company



This 30,000 kva frequency converter is installed in the Metuchen Switching Station, Metuchen, N. J., for service to the Pennsylvania Railroad electrification between New York and Wilmington, Del. It is designed to convert 13,200 volt, 60 cyc., 3 phase energy into 11,000 volt, 25 cyc., 1 phase. Station Design & Construction—United Engineers & Constructors Inc., Newark, N. J.

Because of the known superiority of OFHC (oxygen-free high conductivity) copper, it was specified for use wherever copper was required in both units of this set . . . Important designers, manufacturers and users of electrical equipment, realize that OFHC Copper assures unexcelled purity of product, absence of oxide inclusions, and high electrical conductivity . . . Every step of the production of OFHC Copper is controlled to give a product which will live up to the high requirements of important service.

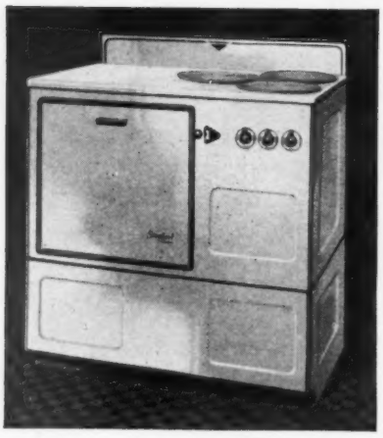
United States Metals Refining Company, 420 Lexington Avenue, New York, N. Y.

OXYGEN-FREE OFHC REG. U.S. PAT. OFF. HIGH CONDUCTIVITY

NEW RANGE MAKES BOW

"JEWEL BOX" BRINGS "OHS" AND "AHS"

New "Standard" fits Modern Kitchen



"IT'S a jewel!" "What a beauty!" "Call it the Jewel Box!" And the name stuck.

A beautiful JEWEL BOX in appearance ...in a new, specially developed two-tone all porcelain enamel finish with STAINLESS porcelain enamel table top.

A jewel in performance. Perfect results from every test. Large capacity. It will bake, roast, broil to perfection. New ideas in operating efficiency. New compact convenience in the cab base with toe-room space...an innovation in a range at this price...and the just-right-height table top design. Fits beautifully into the modern kitchen.

The oven of this new model is 16x16x14 inches, with broiler compartment and broiler pan and basket-type baking rack. Oven has *indicating* temperature control.

And you are likely to find that the "JEWEL BOX" is a jewel for sales, too, when you learn at what price it is available for campaigning and developing volume business by opening up thousands of homes heretofore closed to electric ranges on account of price.

PRICE? Mail Coupon

The Standard Electric Stove Co.,
1712 North 12th St.,
TOLEDO, OHIO

☐ Please send price and other details of the "JEWEL BOX."

☐ Send complete Standard Catalog.

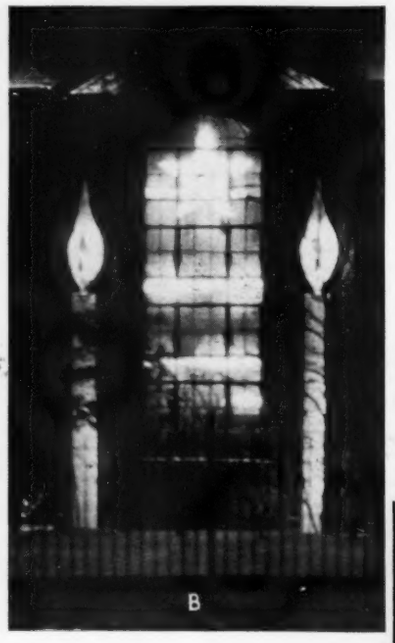
Name .....

Address .....

City..... State.....

"HOLIDAY GREETINGS"—SAY IT WITH LIGHT

A



B

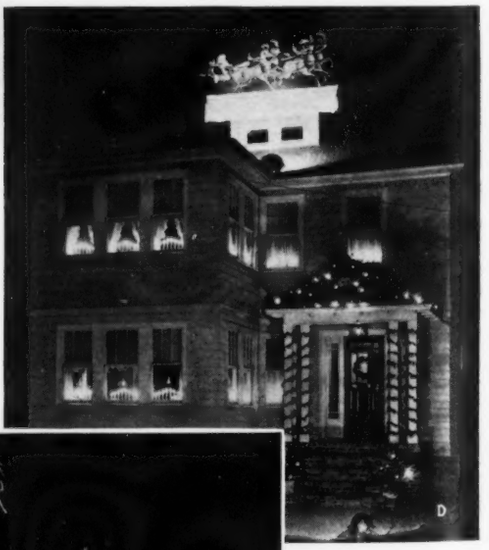
Householders and apartment-house owners can be stimulated to display the Xmas and New Year's spirit with decorative lighting if they are shown distinctive ways of doing so and if suggestions are made on materials and equipment available for producing the effect. Every company should have available pictures of attractive festive lighting and can, through the aid of equipment manufacturers, provide domestic customers with the suggestions for executing the ideas.—*Dean Warren, Nela Park, Cleveland.*

A—It's Christmas. The familiar evergreen roped in blazing pearls in front of this apartment house tells all.

B—The candle, through usage associated with Christmas, and the star, symbolic of the nativity, herald the approaching season. The candles are wood framed and covered with muslin, behind which are located lamps regularly spaced to provide a uniform effect. A flame effect is given by flasher operation of lamps; the lamps being located behind a three-plane design.

C—An unusual and extremely distinctive treatment of a residence. The unit is a three-plane element behind which are located lamps of contrasting colors.

D—A unique treatment for the home. Santa Claus and his reindeers, silhouetted against the blackness of night, attract attention, while the candle-lighted windows and the flood-lighted doorway issue a hospitable welcome to the invited guest.



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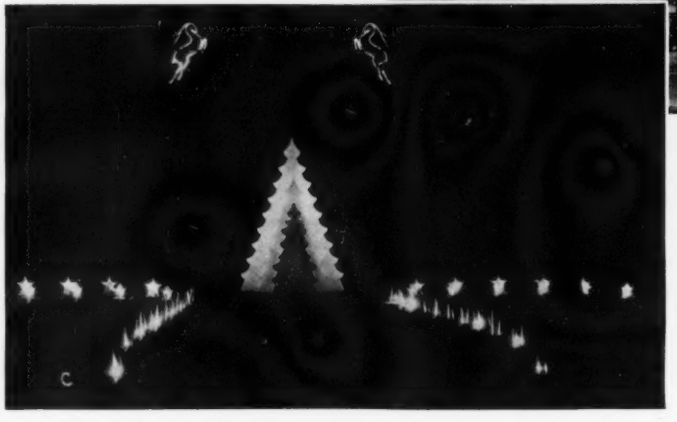


C

TAXES can come only from PROFITS

WE ARE all inclined to grumble about taxes. But no sane person would willingly give up the benefits which taxes make possible. No one would want to give up police and fire protection, to let unfortunate people starve, to be without an army and navy, or universal education, or good roads.

But where are these taxes coming from? Let's look at the figures.

Of the taxes paid in 1933, $249,602,895 came from railroads, about 325 millions from electric and gas utilities, more than 85 millions from telephone companies, and about a billion from automobiles.

These are some of the big ones. But every business, big or small—hundreds of thousands of them—contributes heavily to the support of government. These taxes, eight billion dollars in all, must come directly or indirectly from profits.

IT IS a mistake to assume that business profits go only to the wealthy. One reason why hundreds of thousands of people can stand their share of taxes is that the profits of business are shared with millions of individuals. A recent study of 151 large corporations showed them to be owned by 9,406,845 stockholders. It is these millions and millions of others dependent upon business who must pay the national tax bill. If every one of the 7,430 personal incomes of $50,000 and over were confiscated, the sum total would still be but a fraction of the tax money needed.

If we are to enjoy the benefits that taxes make possible, the sources of national income must be guarded and permitted to expand. For the United States must live on the profits of business.

A business that is losing money can pay taxes for a while out of capital. But as its capital shrinks, it must cut down its working forces, pay starvation wages, discontinue dividends, default on bond interest and becomes a sort of public liability.

Ours is not a *profit* system; it is a *profit and loss* system. But the nation prospers only from profits. Each business failure is a social calamity. America's very manner of living is dependent upon business success.

Any man with courage to start a business and intelligence to guide it successfully is an asset to society and merits encouragement and adequate reward. Upon such men rests the responsibility of recovery.

Remington Rand is proud of the fact that it can say to the business man "No sale without a profit to the user." The Remington Rand man has nothing to sell except a satisfactory and *profitable* result. He can advise exactly the right equipment because his company manufactures a complete line of all types of adding and accounting machines, typewriters, files, record systems and equipment—each designed to inter-member and co-ordinate to get record results at the lowest cost.

Remington Rand can accept the full responsibility of installing and organizing a complete business method because, along with machines and equipment, it has a "know-how"—a cumulative experience—that can come only from thousands of individual analyses and studies. There is a Remington Rand man within reach of your telephone. Call him, or write Remington Rand Inc., Buffalo, N. Y. (Canada: 68 King St., W., Toronto.) World's largest manufacturer of systems, machines and methods for the office.

Remington Rand

BUFFALO, NEW YORK

ANALYZE ANY GASOLINE ENGINE

offered for 1200 R.P.M. to 1500 R.P.M.

If counter-weights are omitted from the crankshaft it is not in true dynamic balance.

If aluminum pistons are not used it is not a high speed engine.

Omission of these two essential elements, marks such engines overspeeded above 900.

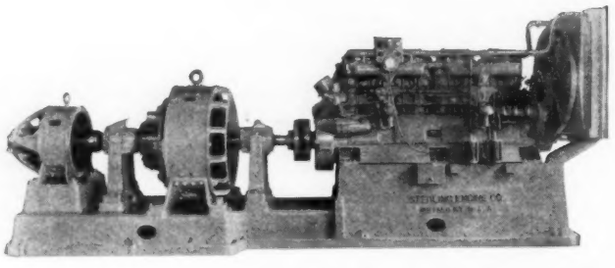
For real emergency specify

Sterling High Duty

Sterling — THE ENGINE OF REFINEMENT

Internal Combustion Engines

12 to 565 B.H.P., Gas or Gasoline



For emergency power to operate the Arlington Memorial Bridge at Washington, D.C., a Dolphin T-8 cyl. 240 H.P. Sterling engine drives a Westinghouse generator direct connected at 1200 R.P.M.

STERLING ENGINE COMPANY

Home Office and Plant
1270 Niagara St.,
Buffalo, New York

Dept. C-2

Branch Office
900 Chrysler Bldg.,
New York, N. Y.

SALES OPPORTUNITIES IN NEW CONSTRUCTION

TROY, OHIO—Gummed Products Company plans installation of motors and controls, conveyors, etc., in new addition to paper-products plant, including improvements in present factory. Cost about $200,000. John H. Deeken, Times-Star Building, Cincinnati, Ohio, is architect.

PLAINVIEW, TEX.—Plans new city-owned electric light and power plant. Financing in amount of $423,000 is being arranged through Federal aid.

BRISTOL, VA.—East Tennessee Light & Power Company plans rebuilding of portion of local light and power plant, recently destroyed by fire. Loss close to $200,000, including equipment.

BEATRICE, NEB.—Southeast Nebraska Power District, J. Edward Fisher, Beatrice, secretary, soon takes bids for electrical distribution system for light and power service in rural districts in Southeastern part of State, totaling about 600 miles. Fund of $575,000 has been secured through Federal aid. Lawrence C. Black is engineer.

MILWAUKEE, WIS.—Milwaukee Electric Railway & Light Company has approved plans for new outdoor power substations at Port Washington and Saukville, Wis., and for addition to power substation at Granville, Wis.

GLASGOW, VA.—Blue Ridge Company, Inc., recently organized with capital of $1,000,000, care of the Ballinger Company, 105 South Twelfth Street, Philadelphia, Pa., architect and engineer, soon begins construction of initial units of new woolen and carpet mill on tract of land recently acquired at Glasgow, including power house. Installation will include motors and controls, transformers and accessories, conveyors, etc. Cost over $200,000. Company is affiliated with Charles P. Cochrane Company, Philadelphia.

SHELDON, IOWA—Has plans maturing for city-owned electric light and power plant. Fund of $240,000 is being arranged. H. L. Cory, Omaha, Neb., engineer.

TACOMA, WASH.—Northern Pacific Railroad Company, St. Paul, Minn., plans installation of motors and controls, conveyors, electric hoists and other equipment in new car and locomotive shops at South Tacoma, to replace units destroyed by fire. Cost over $100,000.

KANSAS CITY, MO.—Liquid Carbonic Company, Chicago, Ill., plans installation of motors and controls, compressors, conveyors, etc., in new multi-story dry ice-manufacturing plant at Kansas City, where site has been selected on Fourteenth Street. Cost over $250,000.

TOGUS, ME.—Construction Service, Veterans' Administration, Washington, D. C., asks bids until January 3, for buildings and utilities for institution at Togus, including ice-making and refrigerating plant, outside electrical distribution system, motors and controls, electric elevators, interior electrical work, power equipment, etc. Estimated cost of entire project, $1,000,000.

HAVANA, ILL.—Crescent Forge & Shovel Company plans installation of motors and controls, hoists, conveyors, etc., in connection with rebuilding of shovel and agricultural implement plant, recently destroyed by fire. Loss close to $100,000.

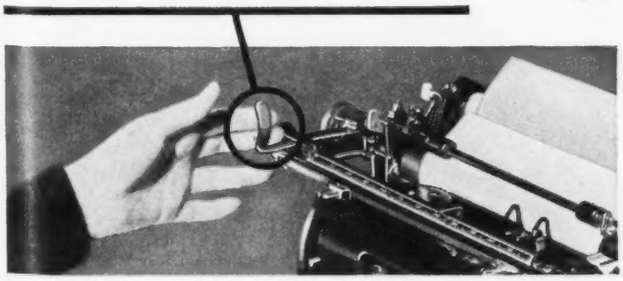
PICKWICK LANDING, TENN.—Tennessee Valley Authority, Knoxville, Tenn., plans

[*Continued on page 94*]

Burroughs
TYPEWRITER

ELECTRIC CARRIAGE RETURN

HAND RETURN replaced by KEY RETURN



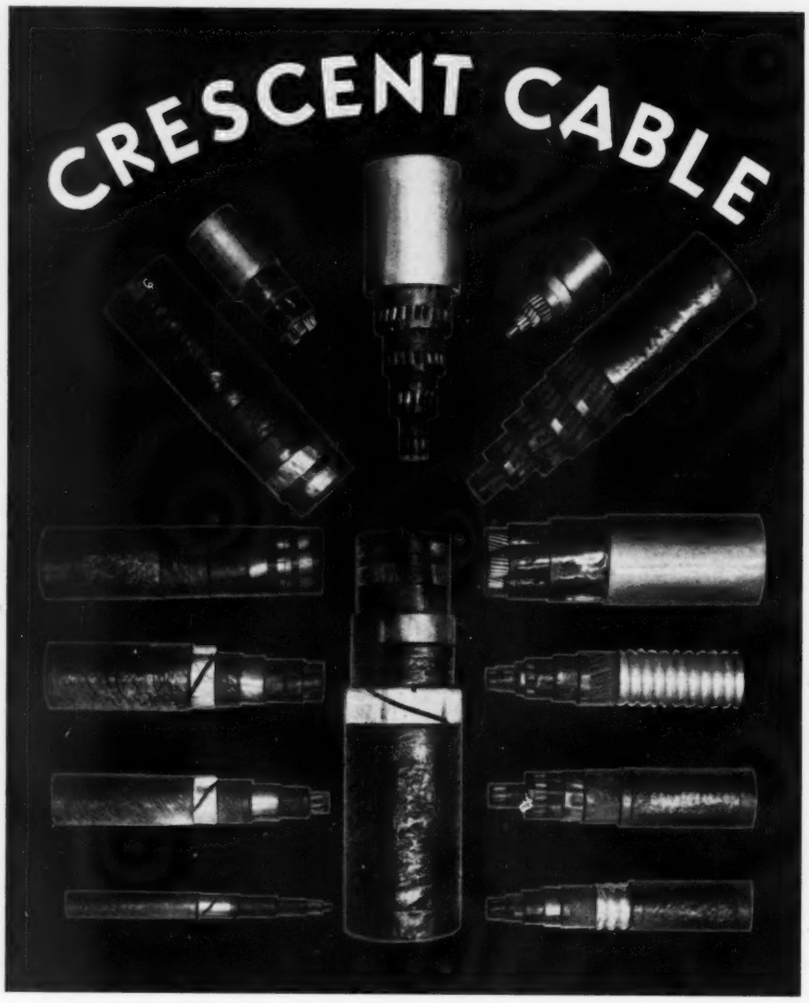
No longer need the operator's hand leave touch position to return the carriage. The "Carriage Return Key" on Burroughs Electric Carriage Typewriter instantly returns the carriage to the starting point or to any pre-determined intermediate point, and the paper spaces up automatically. This makes touch typing complete. Shifting for capitals is also electric. Size, shape and keytouch are like other Burroughs Standard Typewriters. Write for free, descriptive booklet.

Typewriter Division

BURROUGHS ADDING MACHINE COMPANY

DETROIT, MICHIGAN

ACCOUNTING, CALCULATING AND ADDING MACHINES • CASH REGISTERS • POSTURE CHAIRS • SUPPLIES



The above is a representative group of various types of Power, Signal and Control Cables as furnished to many of the foremost Railways, Utilities and Industrials in the country.

CATALOG ON REQUEST

CRESCENT PRODUCTS—*A Complete Line*

"Imperial" 30%, Intermediate, and Code Rubber Covered Wire and Cable

SAFE-COTE

All kinds of Special Wires and Cables for Signals, Radios, Annunciator Systems, Bridges, etc., where highest uniform quality and longest life are essential.

CRESCENT INSULATED WIRE & CABLE CO. INC.
TRENTON, NEW JERSEY.

call for bids early in 1935 for new control dam on Tennessee River, near Pickwick Landing, designed as highest single-lift navigation lock in world, including lock-operating machinery, power and switching stations, electrical equipment and wiring, conduits, signal apparatus, electric lighting equipment, etc. Estimated cost $22,000,000. At later date, new hydroelectric generating plant will be constructed at dam, with total rating of 204,000 kw., divided into six 34,000-kw. generating units, with power substations and switching stations, and transmission line to connect with existing TVA system.

PECOS, TEX.—Asks bids until December 14 for about 11 miles of 10,500-volt transmission line for electric power service at city-owned pumping plant; also at same time for motor-driven deep-well turbine pumping equipment. H. E. F. Helland, Frost National Bank Building, San Antonio, Tex., is consulting engineer.

SUTHERLAND, NEB. — Platte Valley Public Power and Irrigation District, Gothenburg, Neb., Harry L. Williams, president, asks bids until December 14 for two vertical shaft Francis-type turbine units, complete with governors and auxiliary equipment. Parsons, Clapp, Brinckerhoff & Douglas, 142 Maiden Lane, New York, N. Y., are consulting engineers.

SOUTH SAN FRANCISCO, CALIF.—Is considering new city-owned electric light and power plant, consisting of four Diesel engine-generating units and auxiliary equipment. Cost about $260,000. G. B. Scheer is consulting engineer.

MEDFORD, ORE. — California - Oregon Power Company is arranging fund of $493,386 for extensions and improvements in power plants and system in 1935, including transmission and distributing lines, power substations, equipment replacements, etc.

NEW CASTLE, PA.—Is considering special election in January to approve bonds for $3,750,000 for new city-owned electric light and power plant. Preliminary plans are under way.

DETROIT, MICH.—L. A. Young Spring & Wire Corporation plans installation of motors and controls, hoists, conveyors and other equipment in new one-story wire-drawing mill. Cost close to $100,000.

ALBANY, ORE.—Mountain States Power Company will arrange a fund of about $403,500 for extensions and improvements in 1935, including power plants, power substations, transmission and distribution systems.

LITTLEFIELD, TEX.—Soon takes bids for one-story power plant for municipal waterworks, including engine-generator unit and accessory equipment. Also for about 9,700 ft. transmission line, motor-driven centrifugal pumping units and auxiliaries. Fund of $48,000 has been arranged through Federal aid. H. N. Roberts, 2415 Twentieth Street, Lubbock, Tex., is consulting engineer.

MUSKEGON, MICH.—Muskegon Brewing Company, recently acquired by new interests, plans extensions and improvements, including new brew-house and installation of equipment. Cost about $50,000.

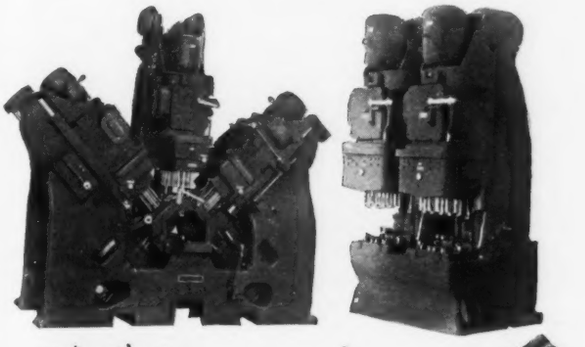
CHICAGO, ILL. — Mars, Inc., plans installation of motors and controls, conveyors, etc., in new additions to confectionery manufacturing plant. Cost about $180,000. W. G. Bennett, 326 West Madison Street, is engineer.

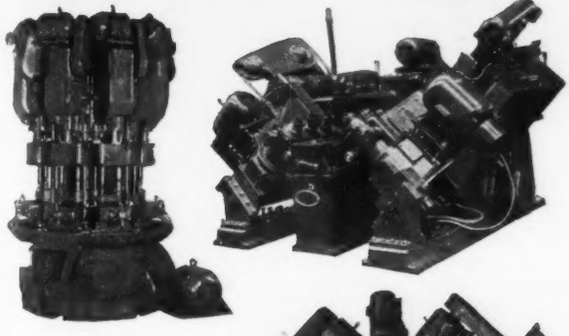
ELGIN, ILL.—Illinois Watch Case Company plans installation of motors and controls, conveyors, etc., in proposed new multi-story addition. Cost about $200,000.

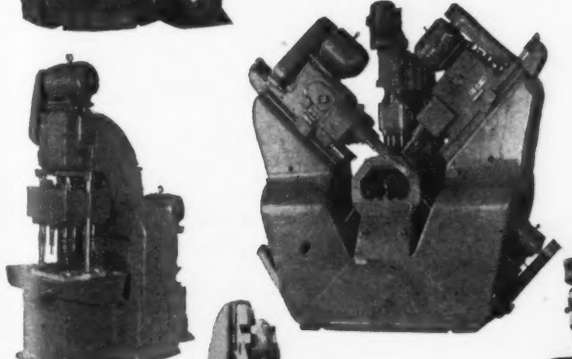
SHREVEPORT, LA. — Jackson Brewing Company, New Orleans, La., plans new plant at Shreveport, including power house. Cost about $175,000.

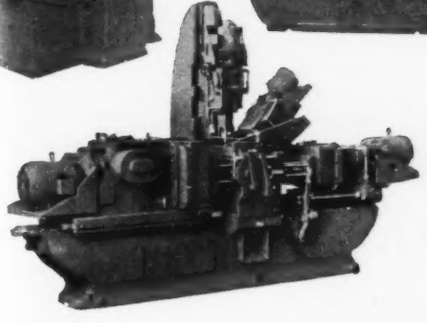
Watch the Cars Roll By

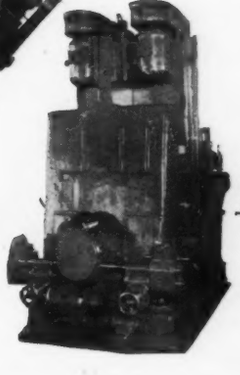
—Thanks to Wagner Type CP Motors

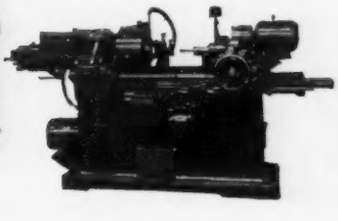












Automobile manufacturers cannot afford an interruption in their manufacturing operations . . . every machine-tool along the line must remain on the job . . . each motor must keep going. Only the sturdiest motors can be used . . . motors that require the minimum of attention . . . motors that can stand up under the gruelling strain of turning out an endless stream of automobiles.

That's why you will find Wagner type CP totally-enclosed fan-cooled motors on the job in automobile plants, for it takes motors of their exceptional quality to keep the wheels of that industry humming. They are totally-enclosed against the entrance of destructive agencies which cause motor shutdowns for cleaning and repairs . . . and are of the finest design and construction electrically and mechanically.

Wagner type CP motors are the choice of automobile manufacturers. They are preferred wherever operating conditions are destructive to open-type motors. Write for Bulletin 174-5B for complete description.

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Motors Transformers Fans Brakes

The machine-tools shown in this advertisement are 100% Wagner-motored . . . an assurance to the user that his well-known cars will keep rolling off the line without an interruption.

L234-5

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Years of satisfactory service under all conditions of anchor guying have proven the dependability of Eversticks. Their great strength and holding power, plus ease and speed of installation are reasons why they are preferred by construction and maintenance engineers the country over.

Everstick Anchors offer a complete line of guy anchors in 2-way, 3-way and 4-way expanding types. All are made of certified malleable iron. Write for Bulletin No. 1033 describing this complete line of Everstick Anchors and Pole Line Specialties.

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. . . . the result of many years' experience in power factor correction in the Capacitor Motor Field. Let us help with your Capacitor problems.

ALSO:
MAGNET WIRE—COILS
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THE ACME WIRE CO., NEW HAVEN, CONN.

BRANCH OFFICES IN PRINCIPAL CITIES

Duct Splices Save Money

[*Continued from page 32*]

pulled out, inspected and reinstalled in the new ducts. Because of the possible corrosive action of the cable sheaths incidental to the curing of the new conduits, which had been constructed less than the desired 60-day period ahead of cable installation, all the cable sheaths and the duct splice casings were covered during pulling with a heavy protective coating (more than $\frac{1}{16}$ in. thick) of special axle grease.

Where duct splices were to be built the first length was pulled in and the pulling line left attached with the forward end in a coil in the manhole for completing the pulling after the splice was finished. The time required to make a duct splice was approximately nine hours. To decrease the time required for duct splicing the three phases, one duct splice was usually made in each manhole at opposite ends of the conduit section simultaneously, and in some cases all three splices were made at the same time by building two splices in one manhole and one in the adjacent manhole. Records for operating purposes were made of the locations in the conduits of the duct splices. The work of making the 66-kv. duct splices was started in June, 1934, and completed about September 1. At the time of writing this article no trouble had been experienced in the construction of the splices or in their operation.

Since the operating voltage of cable on which these duct splices were installed is more than double the maximum operating voltage of cable on which duct splices have been previously used in this country, this installation will be followed with interest.

•

100,000 Ranges Sold in Nine Months

Billed sales of electric ranges during September aggregated 11,932 units, according to an announcement by N.E.M.A. based on reports of eleven companies. The total thus reported for the first nine months comes to 98,957 units, the monthly average for the third quarter being about 11,600 units. On the assumption of 1,750 kw.-hr. per range, and disregarding possible replacements, the year's sales thus far will call for an increase of 175,000,000 kw.-hr. in annual energy consumption.

in Boston-East Boston Vehicular Tube

Again, where human lives are at stake, "Linc-Weld" motors are placed on the job. The two latest underwater vehicular tunnels to be completed—first the Geo. A. Posey tube between Oakland and Alameda, Calif., and now the world's largest, the Boston-East Boston tube—depend on "Linc-Weld" motors to keep the air fresh and remove all danger of asphyxiation. Twenty-eight "Linc-Weld" two-speed squirrel cage type motors drive the fans and blowers which handle as high as two million cubic feet of air per minute, changing all the air in this newest tube 40 times every hour.

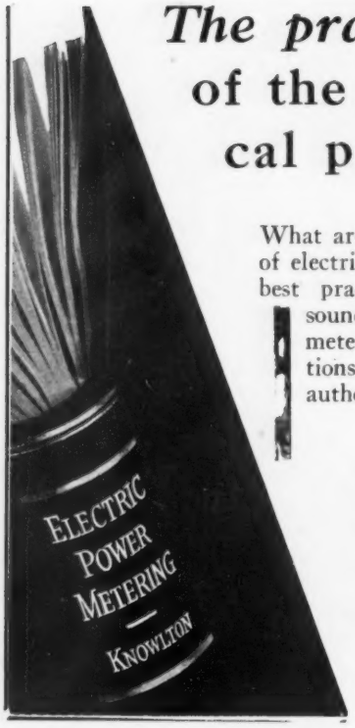
To meet specification demands for extra high efficiency and power factor required only Lincoln's usual standards of design, materials and construction as applied to all types of "Linc-Weld" motors. Thus you, too, can obtain dependability plus improved operating characteristics of "Linc-Weld" motors for your equipment.

LINCOLN

THE LINCOLN ELECTRIC COMPANY, CLEVELAND, OHIO

Manufacturers of "Linc-Weld" Motors and "Shield-Arc" Welders

M-14



The practical fundamentals of the metering of electrical power and energy—

What are the basic principles upon which the metering of electrical power and energy is based? What are the best practical methods of utilizing these principles soundly for kilowatt hour, reactive, demand, telemetering and totalizing applications? These questions are the concern of this thorough and authoritative treatment of metering.

The book is written in the terminology of the meter engineer and special attention is given to the clarification of the obscure phenomena in instrument transformers, induction meters, unbalanced systems, incorrect connections, non-concordant demand measurements, etc.

Just published

Electric Power Metering

By ARCHER E. KNOWLTON

Associate Editor, *Electrical World;* Formerly Associate Professor of Electrical Engineering, Yale University, and Electrical Engineer, Public Utilities Commission of Connecticut

340 pages, 6 x 9, 215 illustrations, $4.00

THIS book has grown out of the special course for utility meter engineers given through more than five years at Yale under the auspices of the National Electric Light Association. The material has developed naturally as the type of information needed by meter engineers. Most of the problems given at the end of the chapters were suggested by meter engineers.

The book gives a detailed analysis of energy metering; explains the basic principles of metering; describes the best practical methods of applying these principles; and covers latest developments.

Some of the topics covered are

—correction factors for ratio departure and phase angle at any load power factor;
—ways of improving performance of instrument transformers;
—technique of commercial test sets in detail;
—ways of metering mixed loads at different voltages and from various phases;
—ways of obtaining precise timing, of avoiding energy waste in testing, and of creating low power factor artificially;
—fusing and grounding practice in polyphase metering;
—methods available for checking connections—scope, limitations and advantages of each;
—schemes for establishing voltage phase shift to quadrature for reactive metering purposes;
—means of metering symmetrical components and unbalance factor;
—demand metering;
—load totalizing—telemetering

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Send me Knowlton's Electric Power Metering for 10 days' examination on approval. In 10 days I will send $4.00, plus a few cents for postage and delivery, or return book postpaid. (We pay postage on orders accompanied by remittance.)

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Savings Recover Motor Cost

[*Continued from page 33*]

37 reactive kva. could be saved; second, by means of the extra corrective effect of the 60 per cent power-factor synchronous motor over the 100 per cent power-factor synchronous motor. This amounted to 112 kva. at full load. Apparently $800 in extra cost would correct conditions a total of 37 plus 112 kva., or 149 reactive kva., thereby raising their power factor to 90 per cent and reducing the kva. to 740. Capacitors for doing this same work would have cost, installed, approximately $2,300, which indicated a decided advantage for the synchronous motors having the 60 per cent leading power-factor characteristic.

Resultant savings have been estimated as follows:

New substation	$2,500
Increased wiring (to carry the high kva.)	1,000
Power cost, per year	1,000

Since the new equipment has been installed the demand seldom exceeds 700 kva. and then only for short periods of time. The plant power factor during normal operation varies between 98 and 100 per cent, dropping off to 94 or 95 per cent at peak loads. The voltage at the ends of the feeders remains steadier than before and the compressor runs quietly day and night.

•

Free Use of Maps and Diagrams Helps Operation

Possession and use of system maps and diagrams have usually been confined to a few persons. The reason is, of course, that copies cost money; if the copies are made by blueprinting or like processes the cost is too high for them to be handed out to all and sundry.

Yet it is undoubtedly a good thing for such system information to be in the possession of all employees who might conceivably have any use for it, who might benefit from it or who are just interested. To be so freely and widely distributed reproductions have to be of very low cost. Many companies are finding the answer in photographic plate and offset printing processes available under various trade names. The unit cost of reproductions in large batches from these processes is very low, much less than for a fraction of the number of blueprints. For the purpose of general information to large numbers of employees maps and diagrams do not have to be kept strictly up to the minute and companies that are using these process copies find that revisions are not necessary oftener than once a year.